

COMMONWEALTH OF VIRGINIA



Information Technology Resource Management (ITRM)

PROJECT MANAGEMENT GUIDELINE

Virginia Information Technologies Agency (VITA)

Reviews

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Questions related to this publication should be directed to the Director of VITA's Policy, Practice, and Architecture (PPA) Division. PPA notifies Agency Information Technology Resources (AITRs) at all state agencies, institutions and other interested parties of proposed revisions to this document.

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Preface

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COV ITRM Project Management Guideline CPM 110-03

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Management, governance, and oversight of Information Technology Projects

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Scope

This guideline is recommended to all Executive Branch state agencies and institutions of higher education (hereinafter collectively referred to as "agencies") that are responsible for the management, development, purchase and use of information technology resources in the Commonwealth of Virginia.

Purpose

This guideline recommends direction and technical requirements which govern the acquisition, use and management of information technology resources by executive branch agencies.

General Responsibilities

Secretary of Technology (SoTech)

Reviews and approves statewide technical and data policies, standards and guidelines for information technology and related systems recommended by the CIO.

Chief Information Officer of the Commonwealth (CIO)

Develops and recommends to the Secretary of Technology statewide technical and data policies, standards and guidelines for information technology and related systems.

Virginia Information Technologies Agency (VITA)

At the direction of the CIO, VITA leads efforts that draft, review and update technical and data policies, standards, and guidelines for information technology and related systems. VITA uses requirements in IT technical and data related policies and standards when establishing contracts; reviewing procurement requests, agency IT projects, budget requests and

strategic plans; and when developing and managing IT related services

Information Technology Advisory Council (ITAC)

Advises the CIO and Secretary of Technology on the development, adoption and update of statewide technical and data policies, standards and guidelines for information technology and related systems.

Executive Branch Agencies

Provide input and review during the development, adoption and update of statewide technical and data policies, standards and guidelines for information technology and related systems.

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Section 1. Introduction

1.1 Objective of the Commonwealth Project Management Guideline

The primary objective of the Commonwealth Project Management Guideline (PM Guideline) is to define a methodology for the management of projects by executive branch agencies in the Commonwealth of Virginia. The guideline is consistent with "best practices" established by the Project Management Institute (PMI) and documented in the Project Management Body of Knowledge (PMBOK). Information provided in the guideline also serves as a common reference point and language for the discussion and implementation of project management in the Commonwealth.

1.2 Applicability to State Agencies

The PM Guideline is recommended to all state Agencies that are responsible for the management, development, purchase, and use of information technology investments in the Commonwealth.

1.3 Applicability to Institutions of Higher Education

The PM Guideline is recommended to all state institutions of higher education that are responsible for the management, development, purchase, and use of information technology investments in the Commonwealth; however, this guideline may not be applicable to research projects, research initiatives, or instructional programs at public institutions of higher education.

Institutions of higher education that have executed Management Agreements with the Commonwealth are permitted to implement their own Project Management Standards and Guidelines and shall provide copies of those documents to the Secretary of Technology.

1.4 Glossary

As appropriate, terms and definitions used in this document can be found in the COV ITRM IT Glossary. The COV ITRM IT Glossary may be referenced on the ITRM Policies, Standards and Guidelines web page at <http://www.vita.virginia.gov/library/default.aspx?id=537>.

1.5 Authority

This guideline is promulgated under the authority of the Commonwealth of Virginia Secretary of Technology.

1.6 The Iterative Process of Project Management

Commonwealth Project Management is comprised of project management knowledge areas, a project lifecycle, and general management activities. PMI has organized the contents of PMBOK around the Project Management Framework which consists of six PM Process Groups (Initiating, Planning, Executing, Monitoring and Controlling, Closing process groups as well as Professional and Social Responsibility) and the 9 Knowledge Area Processes. A knowledge

area is a collection of project management skills and practices for a particular management process such as "Project Scope Management." This guideline applies the knowledge and practices derived from Project Management Knowledge Areas to tasks performed in the lifecycle of a project.

Project management is an iterative process because each phase in a project lifecycle builds on the previous phase. An example of the iterative nature of project management is that the detailed Planning phase is, in part, a refinement of the initiation phase. There may be overlap between phases and in some cases, a phase may be repeated due to changes within a project. During each phase, project managers perform three important general management activities. The activities are planning, execution, and control. The activities are repetitive and may occur in order or in some instances simultaneously. A project manager, for example, will plan the execution of tasks for the initiation phase and then execute and control the planned tasks for that phase.

1.7 Tailoring the Guideline to Your Project

Project managers may tailor the implementation of this guideline to meet the unique requirements for management of projects within their agencies. Because the guideline is largely based on commonly accepted project management best practices, agencies should approach tailoring of the guideline, project by project, through a deliberate decision-making process that clearly establishes the necessity and value of the contemplated changes or tailoring decisions. Project managers must assess individual project characteristics and determine how best to apply the guideline and implement associated processes.

1.8 Concepts Used in the Project Management Guideline

1.8.1 Project Lifecycle

The COV ITRM Glossary defines a project as a temporary endeavor undertaken to create a unique product, service or result. Typically, Project Initiation begins when an agency decides to move forward with a project identified in the Agency Strategic Plan that has been granted Planning Approval by the CIO. The lifecycle of a project begins when a person or organization recognizes a business need or problem requiring a solution. Projects are not just a set of tasks to perform. A project is a process that produces a unique product or service, which allows the organization to achieve a desired business goal.

1.8.2 Temporary Endeavor

A project is a temporary endeavor, with a defined beginning and end date, to produce a unique product, service or result. The project is normally constrained by date, but can be constrained by funding or deliverable. A successful project is closed once the unique product, service or result is delivered and accepted by the business owner. There are other reasons for project closure but the goal is to complete the project, as defined by the project charter on time, within scope and within budget. A project can be closed or canceled for other reasons as voted on by the IAOC (Internal Agency Oversight Committee). The basic question for defining success is, "What is the business reason for this project?" Criteria for project success must be quantifiable, measurable, and expressed in terms of business value. Criteria for project success must be quantifiable, measurable, and expressed in terms of business value.

1.8.3 Delivery of a Unique Product or Service

Projects deliver tangible and unique products or services. To deliver value, projects must be based on defined business objectives. The products or services delivered must satisfy a critical need that supports the agency's operations. Without well-defined business objectives, as well as clearly identified needs, a project will fail because it lacks purpose and focus.

A business critical need is derived by identifying a change in current capability that is necessary for an agency to attain a specific business objective. Defining the need requires considerable care. A thorough analysis of business need, making the "business case," initiates the project lifecycle by focusing on the "right product or service" that best meets the business need.

1.8.4 Commonwealth Projects

Commonwealth Projects differ in definition from generic projects because of Commonwealth law, executive orders, policies, standards, and guidelines, which establish the environment within which projects are managed. In the Commonwealth of Virginia, Commonwealth Projects are defined as: A temporary endeavor, undertaken by a Commonwealth executive branch agency (or agencies), to deliver a unique product or service. Commonwealth Projects are expected to follow project management best practices and comply with project management requirements identified in the Code of Virginia, Governor's Executive Orders, and COV ITRM policies, standards, and guidelines.

1.8.5 Project Management Environment

Successful project management is predicated on an environment where sound management practices are in place. The principles, concepts, techniques, tools, and skills of general management are the foundation for successful project management. Critical among these are basic people skills and financial management skills, established processes for organizational planning and communication, availability of tools that support management processes and a culture that values cooperation and teamwork.

1.8.6 Commonwealth Project Management

Commonwealth Project Management (CPM) differs from generic project management because of Commonwealth laws, executive orders, policies, standards, and guidelines, which establish the project management environment. In the Commonwealth of Virginia, Commonwealth Project Management is defined as: The application of knowledge, skills, tools, and techniques to meet or exceed stakeholder needs and expectations from a Commonwealth Project.

1.9 Project Roles and Responsibilities

Clearly defined project stakeholder roles and responsibilities provide each individual, associated with the project, with a clear understanding of the authority granted and responsibility exacted for the successful accomplishment of project activities. Project stakeholders must be accountable for the effective performance of their assignments.

On a large project, individual role assignments may require full-time attention to a particular function.

On smaller projects, role assignments may be performed part-time, with stakeholders sharing in the execution of multiple functions.

The identification of specific stakeholder tasks is addressed in the Organizational Breakdown Structure (OBS), in Section 3 (Project Planning) of the Guideline.

1.9.1 Project Stakeholders

Stakeholders include all individuals and organizations having a vested interest in the success of a project. Stakeholder participation helps to define, clarify, drive, change, and, ultimately, ensure the success of the project.

To ensure project success, the project management team must identify stakeholders early in the project, determine their needs and expectations, and manage and influence those expectations over the course of the project.

Key project stakeholders include (but are not limited to) the:

1.9.1.1 Agency Management

Agency management includes those individuals responsible for the core business activities of the agency. Within the context of the agency strategic plan, agency management identifies the need for a project, assess project risk, and request approval of the project from the appropriate investment management authority.

1.9.1.2 Customers

Customers are the ultimate users of the product or service the project will deliver. They could be, for example, state employees, businesses, or citizens.

1.9.1.3 Internal Agency Oversight Committee (IAOC)

The Internal Agency Oversight Committee provides recommendations to business leaders regarding project initiation or continuance, management, baselines (performance, cost, schedule and scope), periodic reviews, and any additional follow-up actions required to ensure the success of the project.

1.9.1.4 Program Manager

When established by business leaders, program managers are responsible for oversight, coordination, and integration of a group of related projects. Program managers manage resources across projects within a program and review projects for compliance with established standards. Additionally, the program manager provides guidance and supports the development of an enhanced project management capability.

1.9.1.5 Project Manager

The project manager is the person assigned by the performing organization to achieve the project objectives. The project manager must ensure that the project is successfully

executed, completed on time, within scope, within budget, and at an acceptable level of quality.

1.9.1.6 Project Sponsor

The project sponsor is an individual, usually part of the agency management team, who makes the business case for the project. This individual usually has the authority to define project goals, secure resources, and resolve organizational and priority conflicts. The Project Sponsor needs to be someone who has the authority to secure resources and resolve organizational and priority conflicts. However, you may need a business owner, who will ensure availability of resources at critical points in the project plan and ensures that tasks are completed on time. The business owner ensures achievement of what is defined in the business case and ensures the solution meets the needs of the business.

1.9.1.7 Project Team

The Project Team is the group of people that execute and deliver the project. It consists of a Project Manager and a variable number of Project Team members, who are brought in to deliver their tasks according to the project schedule.

- The Project Manager is the person responsible for ensuring that the Project Team completes the project. The Project Manager develops the Project Plan with the team and manages the team's performance of project tasks. It is also the responsibility of the Project Manager to secure acceptance and approval of deliverables from the Project Sponsor and Stakeholders. The Project Manager is responsible for communication, including status reporting, risk management, escalation of issues that cannot be resolved in the team, and, in general, making sure the project is delivered in budget, on schedule, and within scope.
- The Project Team Members are responsible for executing tasks and producing deliverables as outlined in the Project Plan and directed by the Project Manager, at whatever level of effort or participation has been defined for them.
- On larger projects, some Project Team members may serve as Team Leads, providing task and technical leadership, and sometimes maintaining a portion of the project plan.
- The Executive Sponsor is a manager with demonstrable interest in the outcome of the project who is ultimately responsible for securing spending authority and resources for the project.
- The Project Sponsor and/or Project Director is a manager with demonstrable interest in the outcome of the project who is responsible for securing spending authority and resources for the project. The Project Sponsor acts as a vocal and visible champion, legitimizes the project's goals and objectives, keeps abreast of major project activities, and is a decision-maker.

1.9.2 Project Management Organizational Structure

Project management organizational structure can have a significant impact on the success of any project. A clear description of the project management organization, coupled with well-defined stakeholder roles and responsibilities, is a prerequisite for project success. The most well known organizational structures within the Commonwealth are projectized, functional, matrix, and mixed.

1.9.2.1 Projectized (Pure Project) Organization

The projectized organization typically includes dedicated, full time team members with different skill sets that stay together, as a cohesive unit, for the life of the project. The project manager has the most authority in the projectized organization.

Advantages of the Projectized Organization

- Clear lines of authority, the project manager has full authority
- Response to customer and stakeholder issues is faster and clearer
- Skilled project team can support several successive projects of the same type
- Timely decision-making
- Organizational structure is simple, flexible, and easy to understand.
- Project is managed holistically

Disadvantages of the Projectized Organization

- Expensive approach because of the duplication of personnel
- Equipment and personnel may be hoarded to ensure access to those resources
- Team members lose access to a repository of functional or technical expertise
- Policies and procedures are often applied inconsistently
- Team members may be anxious about post-project work

1.9.2.2 Functional Organization

The functional organization is a hierarchal organizational structure where project team members are grouped by specialty (i.e. marketing, accounting, etc.); have a clear line of authority; and, have one superior within their functional organization.

In a functional organization, the line of authority normally goes from the project manager, through a functional manager, to the project team member. The project manager's direct authority over the project team is limited.

Advantages of the Functional Organization

Flexibility in the use of staff

- Subject Matter Experts (SME) available to work on multiple projects
- Knowledge and experience readily shared between functional specialists
- Technical continuity exists within the organization
- Clearly defined professional growth and career paths for the staff

Disadvantages of the Functional Organization

- Project customer is not the only focus
- Organization does not focus on solving project business issues
- Project does not have a single individual responsible for all aspects of the project
- Response to customer needs is slow and difficult
- Project issues are not all given the same level of attention
- Project is not managed holistically

1.9.2.3 Matrix Organization

Matrix organizations are a combination of projectized and functional organizations. It is an organization in which project team members are “borrowed” from their functional organizations to work on a specific project and then returned once their part of the project has been completed or their skills are no longer needed. There are three different types of matrix organizations:

- Weak Matrix: Similar to functional hierarchies in which a project manager borrows an employee from a functional discipline to do work on a project. The project manager’s responsibilities are more coordination and expedition than actual management.
- Balanced Matrix: A combination of weak and strong matrix organizations. In a balanced matrix, the project manager borrows staff from a functional organization on an as needed basis. The borrowed staff works directly for the project manager until their project tasks are completed. In this model, the project manager has authoritative power over management of the project effort.
- Strong Matrix: Similar to projectized organizations. In the strong matrix organization, a project manager has a full time staff borrowed from functional disciplines for the duration of the project. In this model, the project manager has full authoritative power over management of the project effort and the people assigned to the project.

Advantages of the Matrix Organization

- Central focus is the project
- Project managers have access to a large reservoir of technically skilled people
- Project team members have less anxiety about the future
- Customer issues are responded to quickly.
- Administrative personnel are not duplicated in each project team
- Resource balancing between projects is simpler and more efficient
- Project team organization is more flexible

Disadvantages of the Matrix Organization

- Person with decision making power is not always clearly identified
- Resource balancing between projects can lead to friction
- Project closeout tasks are often difficult in strong matrix organizations
- Division of authority and responsibility is complex

1.9.2.4 Mixed Organization

Mixed organizations are a combination of projectized (pure project) and functional organizations. Mixed organizations usually result when small projects are started in functional organizations. As a project reaches the size and level of maturity, which allows the project to operate autonomously, it moves out of the parent, functional organization and operates as a project does in the projectized organization. The project can evolve into a long-term program within the organization or into a unique organization within the enterprise.

The advantages and disadvantages of the mixed organization are the same as those for both the projectized and functional organizations. The advantages and disadvantages that exist in a functional organization apply to projects when they are within those organizations.

When a project moves from the functional organization, the advantages and disadvantages of the projectized organization apply.

1.10 Information Technology Project Management

Information Technology (IT) projects are the same as non-IT projects in many respects. Like all other projects, IT projects are temporary in nature, have a clear start and end date, a defined set of deliverables, and a limited budget. The goal of an IT project is to develop a unique IT product or service, which allows the organization to achieve a desired business goal.

The IT sub-sections within this guideline provide guidance on specific and unique IT project management practices. The guidance is intended to assist project managers in deciding how best to apply general project management concepts to IT projects.

The Systems Development Life Cycle (SDLC) and other development processes for IT fit within the project management framework presented in this guideline. Normally, the project work breakdown structure (or task list) will be based on a standard development process, e.g. SDLC or the Rational Unified Process. For IT projects, product and service delivery is a result of the execution of a selected IT development process within the overall project management framework established by this guideline.

The project management framework is broken down into four phases: Initiation, Detailed Planning, Execution and Control, and Closeout. IT projects can be broken down into the same phases; however, within those phases, several development processes will occur (e.g., feasibility study, requirements definition, specifications design, development, testing, implementation).

A project manager's responsibility is to maintain a high-level perspective of the technical development within the project and ensure that sound project management practices are being appropriately applied. In IT Project Management, the required skill set includes technical knowledge and requires greater skills in the areas of organization and well developed soft skills in managing project teams. Project development can be hampered when the Project Manager is too involved in the technical development of the project. IT project management includes preparation of the documents and plans that are described throughout this guideline. While there will be times on small projects when project managers will be personally and directly involved in the technical development, the most important responsibility of the project manager is to ensure that the project is effectively and efficiently managed to the satisfaction of all project stakeholders.

System development methodologies and project management methodologies are distinct yet related processes. It may be difficult for the project manager to distinguish between the two and discern his or her role within each process. The intent of this section of the guideline is to integrate the processes for project management with the process of system development. For example, in the SDLC, much of the preparatory work for development of an IT product or service takes place within the requirements and design phases. However, from a project management perspective, requirements definition and design can be considered planning phase activities. Clarifying and separating the project management roles and responsibilities from those of technical development of the product or service ensures that project management concepts are initiated and performed.

Figure 1.1 compares the level of management effort versus IT development effort against a backdrop of project management phases. The solid line, labeled "Management Effort,"

depicts the level of effort for project management activities. The dashed line, labeled "Technical Effort," depicts the level of technical development effort. The two efforts are not exclusive but require effective integration to deliver the IT product or service required. Figure 1.1 also gives some indication of where the project team focuses its efforts during the project lifecycle. Initially the team focuses heavily on the management processes of project initiation and project planning. The level of technical effort builds in parallel with the project management level of effort. The two efforts complement each other. As project planning transitions to project execution system, development becomes the central focus of the project team. The project management effort does not stop in the planning phase, but continues through project execution in a supporting role by providing change, communication, quality, risk, and other management processes that keep the technical effort in scope, on schedule and within budget.

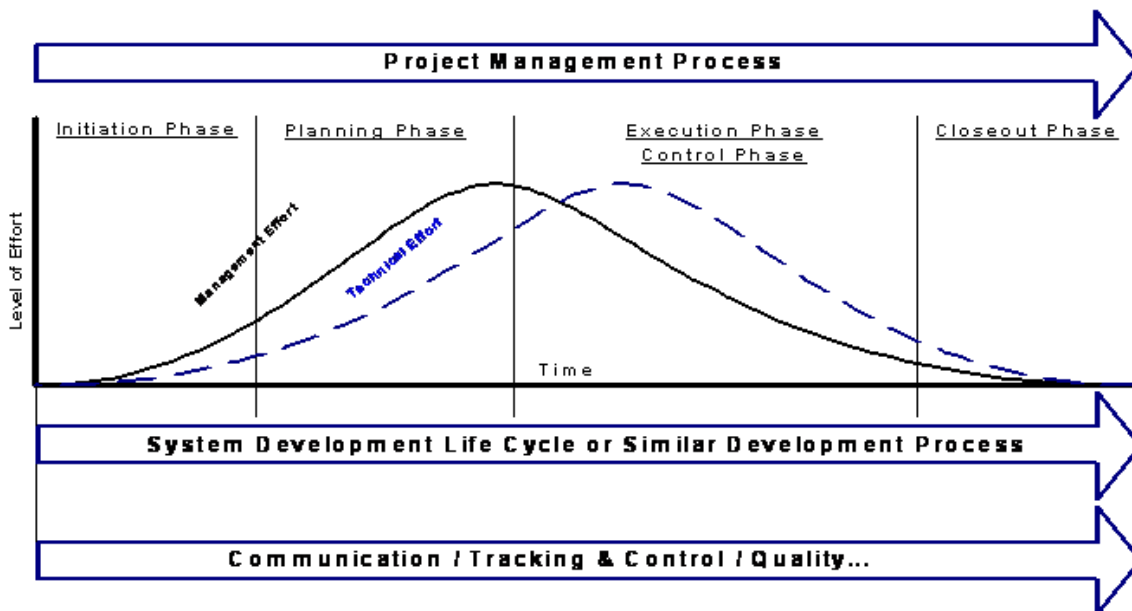


Figure 1 Management Effort Compared to Technical Effort
During the Project Lifecycle

1.10.1 Problems with Managing Information Technology Projects

In general, IT projects face the same management problems as other projects. There are several reasons that IT projects fail or are more difficult to manage. The four most common problems identified with IT projects include:

1.10.1.1 Poor Investment Decision

The decision to undertake an IT project is as important as any other investment decision. The most effective and dedicated project team cannot overcome the selection of the wrong investment by an organization. Chief Information Officers (CIO) or Information Technology Managers sometimes make decisions about projects without business management input. Sometimes business managers do not consider IT projects significant and view IT as just another overhead function. It is imperative that organizations (agencies) apply the same investment management processes to IT projects that they apply to other investment

decisions. When IT projects are treated as business investments, they are more likely to deliver the right solutions on time and within budget.

1.10.1.2 Lack of Management Sponsorship and Stakeholder Involvement

Every project needs a management champion or sponsor. A spokesperson in management must articulate the value of a project to the business and ensure appropriate recognition and support for the effort by the organization. If an IT project originates in the Information Technology Office without management sponsorship, appropriate management support for the project may not be forthcoming. Technology projects require the involvement of many stakeholders outside the project team. Stakeholders must be involved throughout the life-cycle of the project, from requirement definition through acceptance. Buy in from the project team including the business users is also critical to a project. When project teams communicate and consult with stakeholders, projects are more likely to deliver a product that matches the business requirement and is acceptable to its users.

1.10.1.3 Application of Immature or Inappropriate Technologies

One of the major problems IT projects must overcome is related to the selection of a technology solution. Management must weigh the high risk of failure associated with choosing new or "leading edge" technology solutions that are often untried and unproven. Some organizations desire "leading edge" solutions because it offers the opportunity to gain an overwhelming competitive business advantage. Old, proven technologies, used in a new way, can also become untried and unproven technologies. Implementing untried and unproven technologies results in the creation of a "brittle" technology environment that can shatter when new or changed requirements are introduced. Projects that successfully apply new technologies or old technologies in a new way must have sound risk management plans, a change management system with strict controls; buy in from the project team, and the unqualified support of management.

1.10.1.4 Failure to Use a Project Management Methodology

Organizations that use a project management methodology have a significantly higher probability of successfully delivering a project solution. The success resulting from the use of a project management methodology applies equally to technology projects. Technology projects that implement a project management methodology are effectively planned; have appropriate change control processes in place; and, deliver the right product or service, on time, and within budget. Many IT project managers have extensive experience in network or software engineering and, as a result, possess superbly developed technical skills. However, the most successful IT project managers have received training in project management or use a proven project management methodology.

1.10.2 IT Project Management within the Project Management Life Cycle

As you review each of the four project phases presented in the guideline you should note that there is a subsection in each phase named "Information Technology Components." Project managers will not be able to effectively manage an IT project simply by relying on the information presented in this single subsection on IT projects. IT project managers must understand and apply the processes and associated best practices described throughout the guideline.

Section 2. Initiation Phase

Project Initiation is the first phase in the project lifecycle and is the predecessor to the Detailed Planning Phase. In the Commonwealth Information Technology (IT) Strategic Planning Process, IT projects are identified as means to support critical agency business issues or key business initiatives. In the Initiation Phase, IT projects identified in an approved Agency Strategic Plan are transitioned from an idea to a viable project proposal for consideration and approval by agency executive management and, as appropriate, by the Secretary of Technology or the Commonwealth's Chief Information Officer.

The initial project description, provided in the IT Summary of the Agency Strategic Plan, is expanded and developed into a sound business case, describing how the project will address the defined business need or issue and how it will be approached and completed. Various approaches to accomplish the project are analyzed to determine the best, most technically sound, and economically viable solution. The Business Case and Alternatives Analysis (BCAA) form presents a structure where multiple alternatives (solutions) are described and compared, out of which a recommended solution is identified. The preferred solution is presented in the Project Charter, which formally communicates the existence of the project, serves as the basis for detailed project planning, appoints the Project Manager, and authorizes the expenditure of resources. The Project Charter also establishes the initial Budget, Schedule and Scope baselines and establishes the membership of the Internal Agency oversight Committee (IAOC) (Code of Virginia, § 2.2-2021 – Project Oversight). Documents resulting from the Initiation Phase activities are the foundation for planning documents developed in the Detailed Planning Phase.

The Initiation Phase methodology and associated Commonwealth Technology Portfolio (CTP) documentation provide a standard mechanism and format for project alternatives analysis and chartering of projects.

2.1 Activities and Documents in the Initiation Phase

The activities in the Project Initiation Phase are essential steps in the project effort. The Project Initiation Phase documents define the project so all project stakeholders clearly understand the project scope and expected benefits. Project initiation activities also establish executive management commitment to the project and to the allocation of required resources via the Project Charter.

One of the most important activities required in the Initiation Phase, is the designation of a project manager at the time the Project Charter is issued. The experience and abilities of the project manager can make or break a project. A separate section of important considerations for appointing a project manager is included in this guideline. Avoiding common problems encountered during the initiation phase will also greatly improve the chance of success for the project. A list of common problems is therefore included in this guideline as well.

2.1.1 Define: Project Description Statement

The first activity in the initiation phase is to define the project by developing the project description statement. The project description statement is a formal, detailed statement that describes the characteristics of the product or service expected from the project and how it will be delivered. It explains the business purpose of the new product or service and identifies why the product or service is needed. The project description should provide as

much detail as is available and be sufficient to allow decision-makers to decide whether to move forward with the project.

2.1.2 Analyze: Project Analysis

The purpose of the analysis activity is to identify the best solution to solve the identified business need or issue. The project analysis activity involves:

- Analysis of the business problem;
- Identification of potential solutions;
- Studies to determine technical and economic feasibility of potential solutions;
- Comparison of potential solutions; and,
- Identification of the best solution.

The feasibility studies will help determine if potential solutions are viable. Technical feasibility studies determine if an IT solution is technically possible. An economic feasibility study, such as a Cost Benefit Analysis (CBA), determines if a solution is economically sound and cost effective. Based upon these analyses, a solution is proposed in the next step of the initiation process.

The Business Case and Alternatives Analysis (BCAA) form is provided to assist in the analysis of the business need, analysis of potential solutions, and identification of the best solution. In accordance with the Project Management Standard, completion of the BCAA is a mandatory deliverable for all IT projects greater than \$250,000.

The Project Business Case and Alternatives Analysis form, along with instructions, is found in CTP.

2.1.3 Analyze: The Procurement Plan:

A project may require the acquisition of labor, software, hardware or other components. These can be procured by using one or more of the purchasing vehicles available to agencies, including individual Request for Proposal (RFP), Invitation for Bids (IFB), orders from statewide contracts already established or by other means.

As part of the Project Initiation Process, agencies must identify major purchases that will be made in support of the project and define how and when those purchases will be made. The Procurement Plan documents the agency's intentions. This plan was previously required as part of the Detailed Planning Phase, but experience demonstrated that, by the time the plan was completed, the bulk of the purchases had already been made, so procurement planning has been moved to the Initiation Phase of the project life cycle.

A new Procurement Plan will be developed in the Commonwealth Technology Portfolio at some point in the future. Until that form has been added, agencies are required to prepare the form currently extant in the CTP during Project Initiation.

2.1.4 Recommend and Decide: Project Charter

The project charter formally authorizes a project. Approval of the project charter marks the end of the Project Initiation Phase and the beginning of the Detailed Planning Phase. Information in the project charter comes from the BCAA and other documents that identify business requirements and establish senior management commitment.

The project charter describes the project in detail and ensures that its goals, objectives and deliverables are consistent with the agency's Strategic Plan and the IT Summary therein, as well as the Commonwealth Strategic Plan for Technology and other regulatory documents. As a formal project deliverable, it identifies project objectives, provides a project description, defines the approach, and supplies other top-level planning information which, taken together, establish the scope of the project. The project charter provides decision makers with information necessary to make project initiation decisions. The project charter is the foundation for initiation of the project. Specifically the document defines:

- What is to be done
- Why it is to be done
- How it is to be done
- The project cost, schedule and scope, to a level of confidence at least 80%.

In order to complete the charter, an informal plan is required to detail the project management tasks for completing the Initiation phase and conducting the Detailed Planning phase of the project. Normally a plan for this purpose can be a simple schedule of tasks or a Gantt chart and should include:

- A task list required to complete the Project Initiation Phase and the Detailed Planning Phase, (Include any anticipated procurement activities if the project planning will be done by a contractor).
- A time estimate to complete the Project Initiation Phase and Detailed Planning Phase
- The resources needed to complete the Project Initiation Phase and Detailed Planning Phase
- A cost estimate to complete the Project Initiation Phase and Detailed Planning Phase

The Project Charter form, along with instructions, is found in CTP.

2.1.5 Risk and Complexity: Commonwealth Project Governance Assessment (CPGA)

The Commonwealth Project Risk and Complexity Assessment is a tool that is used in the Commonwealth to help agencies and senior leaders determine the level of oversight and governance necessary to adequately manage a given project in order to reduce risk and increase the probability of success. The assessment is conducted at several key points in the project's life cycle and provides a scoring mechanism to determine the level of risk and complexity associated with a project. (Risk is defined as an uncertain event or condition that, if it occurs, could have a positive or negative effect on a project's objectives. Complexity is defined as the technological and management characteristics of the proposed project and the potential impacts, both positive and negative, that these characteristics could have on the project's risks.) Scoring elements in the assessment look at key factors that indicate the degree of risk and complexity inherent in the deliverables that the project envisions and the approach that the agency intends to pursue to provide those deliverables. Each question in the assessment has a number of potential responses and each response has a numerical value. The values from the responses selected are summed, resulting in a numerical score that correspond to a level of project risk and project complexity: High, Medium, or Low.

The completion of the Commonwealth Project Governance Assessment (CPGA) determines the project governance and oversight category. The Project category determines:

- Extensiveness of Detailed Planning

- Documentation requirements
- Approval levels
- Independent Verification and Validation (IV&V) requirements
- Status reporting requirements
- Oversight committee requirements
- Scope, schedule, budget accuracy thresholds
- Post-Implementation Review requirements

The objective of the CPGA is to fine tune the amount of oversight and governance, so that any given project has neither too little nor too much of it. Typically, there will be collaboration between the agency and the Project Management Analyst through the use of CPGA questionnaires to determine the right amount of oversight and governance needed. The first CPGA questionnaire, the "CPGA Pre-Select Risk/Complexity Assessment" is completed during the Pre-Select and Select phases of the ITIM process. The "CPGA Project Initiation Approval Risk/Complexity Assessment" is completed during the Initiation phase. The "CPGA Planning Risk/Complexity Assessment" is completed during the Detailed Planning phase, and the "CPGA Event-Driven Risk/Complexity Assessment" is completed if/when a rebaselining occurs that requires approval above the Internal Agency Oversight Committee level, during the remainder of the project lifecycle.

2.2 Selection of a Project Manager

Selection of the project manager is formalized and approved as part of the Project Charter during the Project Initiation Phase. Completion of the Project Initiation Phase is typically the responsibility of the Project Sponsor or another executive-level leader within the sponsoring agency; however, a Project Manager-designee may be identified to assist with or perform project initiation duties. The Project Manager formally assumes his/her responsibilities upon the approval of the Project Charter. Selection of the right project manager is a critical task. The demonstrated knowledge, skills, and abilities of a project manager have a direct impact on the probability of success of any project. The Commonwealth Project Manager Selection and Training Standard identifies the experience and training required of the managers of Commonwealth information technology projects.

2.2.1 Project Manager Responsibilities

The project manager is responsible for management of all aspects of the project. From an overall perspective, the project manager ensures the project is on time, within budget, and delivers a product or service at an acceptable level of quality. A project manager's daily management responsibilities typically include some or all of the following:

- Providing direction, leadership, and support to project team members
- Using, developing, and improving the project management methodology within the agency
- Providing teams with advice and input on tasks throughout the project, including documentation, creation of plans, schedules, and reports
- Resolving conflicts affecting the project's resources, schedules, etc.
- Influencing customers and team members to get buy-in on decisions that will lead to the success of the project
- Delegating responsibility to team members

2.2.2 Selection Criteria

Selection criteria for a project manager should be based on the following skills and experience:

- Experience managing projects
- Knowledge of project management methodology and tools
- Demonstrated interpersonal and team leadership skills
- Knowledge of basic business and management skills
- Experience within the project's technical field
- Respect and recognition among peers within the agency

2.2.3 Project Manager Experience

All of the selection criteria listed above are important, but the amount of successful project management experience is the most important. Successful project managers create a record of accomplishment by building on experience and utilizing the knowledge and skills listed in the selection criteria. Therefore, information about the visibility, success, and size a project manager's previous projects are essential to the selection decision. In order to build new project manager competencies, new project managers should first be assigned small projects in order to gain experience prior to managing mid-size or large projects.

Project managers of small projects should have training in the project management methodology and tools used within the agency. They should also have an interest in and reasonable knowledge of the product or services that the project will deliver. Small projects generally involve few people, have limited cost, are low risk, and are very limited in scope. Managers of small projects should have gained some initial experience by working as a project team member under a good senior project manager.

Mid-size projects need leaders who have experience on several small or mid-sized projects. Project managers at this level must have general management and business skills. Mid-size projects pose greater risk than small projects, involve larger numbers of people, and usually incorporate more than one technology type or functional group. Typically, in a mid-size project, the project manager will need to manage several different functional groups with different needs.

Project managers for large projects should have led several high-profile midsize projects successfully. A project manager at this level must understand the technology used but is not necessarily an expert in the specific technology applied. Project managers, of large projects, will focus the majority of their effort on planning and controlling the project. Essential skills are the ability to delegate, manage time effectively, and apply relationship and soft skills to support the project.

2.3 Common Problems during the Project Initiation Phase

Summarized below are some of the problems that have a negative impact on a project during the Project Initiation Phase.

2.3.1 Poor alignment with Business Goals

The results of a project effort must support an agency's strategic goals and business strategy. Using the agency's business strategy and strategic objectives as a starting point for investment selection will save time and effort later. For this reason, it is critical for the agency's business strategy to be visible and understood.

2.3.2 Lack of Management Support/Sponsor

Sometimes there is a recognized need for a project, but there is no one to champion the effort for an executive level. People may or may not support a project for a variety of reasons. Management executives who control funding must have an interest in the project success. Top-level management buy-in must occur at the inception of the project and be visible throughout the life of the project.

2.3.3 Scarcity of Resources

Many resource problems relate to funding and assembling the resources needed to perform initiation activities. Locating people with the right skill set can be difficult, and the difficulty increases with project complexity. Funding for project initiation activities is often constrained or unavailable.

2.3.4 Lack of Consensus on Project Objectives

The most difficult commitments to obtain are from customers and stakeholders. Frequently, there are many different ideas about what the project should include and what the project will develop. It is crucial to have concrete agreement on project objectives.

2.3.5 Lack of Coordinated Leadership

During the initiation phase, stakeholder coordination can be difficult. This is frequently the result of many individuals attempting to influence or lead the project at the same time. Such environments can create an atmosphere of faulty or disjointed decision-making.

2.3.6 Poor Planning

No one can perfectly predict how future events will transpire, but PMBOK describes many methods and techniques to identify deliverables, tasks, task duration and dependencies, and risk identification and management. These planning tools can be mastered, and when intelligently utilized can map out a plan for project that has a good chance of being successful.

2.3.7 Incomplete Requirements

The impact of 'discovering' additional requirements during the execution and control phase (or later) is often devastating to the scope, schedule and budget baselines. Extra effort spent at the beginning of a project can prevent or minimize instances of uncovering additional (and sometimes conflicting) requirements.

2.3.8 Inappropriate Technology Selection

Coordinating and collaborating with the VITA Enterprise Architecture group very early in the project lifecycle should prevent agencies and projects from making untenable choices in hardware, software, infrastructure, and other technologies. Otherwise, this could be a root cause for project failure.

2.3.9 Scope Creep

This may be related to “Incomplete Requirements” – sometimes very well-intentioned people add scope during the project lifecycle, and are often in denial that additional scope must add extra cost and time to the project. A formal change control board should very carefully consider and vote on proposed scope changes.

2.4 Project Description Statement

Development of the project description statement is an essential and defining process in project initiation. What the project is to accomplish must be described in as much detail as is available at the beginning of the project. The statement should describe who the project is for, what must be done, how it will be done and why it must be done. This statement is the foundation for defining the scope of the project.

To arrive at this statement, the project manager or team should perform an abbreviated analysis of the assigned project. The project description statement will:

- describe the general approach to development;
- describe the basic characteristics of the required product or service;
- identify the beneficiary; and,
- identify the purpose served by the product or service delivered.

Example Project Description Statement:

The Department of Accounts (DOA) requires a Web enabled application to facilitate online review of draft Policies, Standards, and Guidelines by focus groups and the COTS Technology Management Work Group. This is a custom application development. The application must provide a user-friendly means of providing specific input on each page and line of a draft document and facilitate rapid analysis by DOA analysts. This is a custom application development that will be undertaken using in-house resources.

2.5 Project Initiation Analysis

There are five basic components to project initiation analysis:

- Analyze the business problem
- Determine an approach to be used
- Develop potential solutions for the problem
- Analyze and compare potential solutions
- Select and make recommendations

A project may have more than one solution that will solve a particular business problem. The goal of this activity is to develop a single recommendation from an analysis of the business problem and possible solutions.

Before identifying any solution, it is first important to understand the business problem, the project business objectives, and the core business activities impacted by the project. This information should be available in the approved Agency Strategic Plan where the project was initially conceived. Understanding the business problem requires the collection and summarization of information on the relevant business issues. Once the business problem has been clearly stated, the project business objectives, core business activities affected, and constraints are then determined. The business objectives must clearly support a strategic business initiative or resolve a critical business issue. Information derived from analysis of the business problem influences the approach taken and solutions selected.

Even when there are multiple solutions available, a single general approach may become apparent through a better understanding of the business problem. The approach is a general vision of how to solve the business problem, for example, the approach may be to buy a commercial-off-the-shelf (COTS) product versus build a new application. The project description statement and information from the business problem analysis provide the information needed to develop a description of the project approach.

Once the general approach is developed, the project manager should identify different potential solutions that fit within the project approach. In some unusual situations, there is a single apparent solution. Normally there are multiple solutions. Each solution should be described so that it is clearly differentiated from other proposed solutions. The Commonwealth Project Management Standard requires consideration of three (3) solution alternatives, one of which should be a status quo or "do-nothing" alternative. The Business Case and Alternatives Analysis (BCAA) is the CTP form where this analysis is documented.

Once solutions are identified for consideration, a set of decision criteria must be selected. The decision criteria should reflect key factors that will determine whether a solution is feasible, and which solution will best deliver the project objectives. The same decision criteria must be used to analyze each solution to establish a common basis for comparing the different solutions. The key is to select the criteria most appropriate to your organization and maintain a consistent approach throughout the analysis of all solutions. Recommended decision criteria include:

- Business Process Impact
- Technical Feasibility
- Maturity of Solution
- Resources Required
- Constraints Impact
- Cost Benefit Analysis
- Return on Investment
- Other

2.5.1 Feasibility Studies

Feasibility studies are the foundations of sound decisions to initiate projects. The feasibility studies determine the availability, appropriateness, and soundness of the technical approach and substantiate the economic viability of potential solutions. Both a technical feasibility study and an economic feasibility study such as cost-benefit analysis are performed.

2.5.1.1 Technical Feasibility Study

A technical feasibility study determines if there are technology solutions available that can deliver the required product or service. The technical analysis also identifies the probability of success for any given solution based upon established criteria. Understanding both the current technical architecture and the maturity of the proposed technology prevents initiation of projects that are likely to fail. Research and analysis of technical solutions may use data available from external sources such as technology publications or research organizations. When there are concerns about how a particular technical solution will work in the organization's environment, the technical study may include testing. The testing can entail creating a prototype solution in a modeled environment or conducting a pilot test of a fully matured solution. Regardless of the approach used to conduct the technical feasibility study, enough detailed information should be evaluated to determine if the proposed solution is likely to deliver the desired results. The results of this study influence the alternatives presented on the BCAA documentation.

2.5.1.2 Economic Feasibility Study: Cost-Benefit Analysis

A cost-benefit analysis (CBA) provides the information to make a balanced decision about the cost and benefits, or value, of various potential solutions. It enables the agency to quantify the activities of existing and alternative solutions. The CBA defines project objectives and alternative solutions in terms of costs and benefits. It also defines important assumptions used to derive the cost and benefits. The final product is a consistent document that provides an understanding of the economic feasibility of the solutions being considered. The CBA is a form in CTP.

The amount of detail and information included in a CBA depends on the size and complexity of the individual project. A brief explanation of the steps for performing a cost-benefit analysis is provided below. More detailed information on conducting a cost-benefit analysis is available from numerous sources including those provided on the Commonwealth Project Management Website.

The general steps for performing a CBA are listed below:

- Define the Project: Defining the project is the first and most critical step. It forms the foundation for the rest of the effort. It includes identifying the problem to be solved, the objectives of the mission or function, and the alternatives that will satisfy the customer's needs while staying within environmental factors such as assumptions and constraints. In the Commonwealth Project Management methodology, the project has already been defined as the first activity in the Project Initiation Phase.
- Research the Cost Elements: In this step, the cost elements that make up the life-cycle cost for each solution are identified. Life-cycle costs consider the cost not only of the project but also the cost of current operations and the post implementation cost for operations and maintenance over the life of the product. Research requirements include: collecting appropriate cost data; analyzing and validating the data; deciding on an estimating methodology; and, costing all the elements.
- Identify Cost Drivers: When research of the cost elements is complete, functional, technical, and schedule cost drivers are identified. Cost drivers are those costs that influence the accuracy or results of the total cost estimate. Usually cost drivers are large cost elements or elements that have a high degree of uncertainty in the estimation of their cost. In preparation for the next step, identify the elements with the greatest potential sensitivity to changes in assumptions or project decisions.

- Analyze Risk and Sensitivity: Calculated costs for each life-cycle phase are aggregated to show total life-cycle costs and benefits. The life-cycle cost information is useful for identification of cost-risk items and for analysis of how changes might alter the original recommendation. It is also used to assess what happens if some sensitive cost elements exceed the current estimate. Sensitivity analysis tests the impact of risk and uncertainty by determining what impact changes in conditions have on the ranking of alternatives.
- Analyze Alternatives: Next, analyze the relative merit of alternatives against each other, including their sensitivity to specified risks and potential changes. The results should also compare net benefits over time or Return on Investment (ROI).
- Present the Results: The final step is to put together presentation materials to support the analysis and recommendations. Typically, the CBA form in CTP is sufficient. Depending on the size and complexity of the project, the presentation format could be as simple as the CTP CBA form, a white paper, a briefing, or it could be a formal report and presentation.

It is important to identify and estimate the costs and benefits using a common, comprehensive structure so alternatives can be consistently compared to reflect accurate results and conclusions. Thus, the CBA form in CTP is a mandatory form.

Results of the cost-benefit analysis are summarized on the Business Case and Alternatives Analysis (BCAA) form in CTP.

2.5.1.3 Economic Feasibility Study: Return on Investment (ROI)

Another form of economic analysis is Return on Investment (ROI). ROI is a financial accounting measurement for determining the value of making a specific investment. ROI is a ratio of the net benefits to the total cost of an investment for the same specific period. The two principle concerns with ROI are that the calculations do not account for the time value of money and the calculations assumes a consistent annual rate of return. ROI is a useful measure when comparing alternatives using the same cost and benefit criteria for the same period.

The formula for calculating ROI is:

$$\text{ROI \%} = [(\text{Benefits} - \text{Costs})/\text{Costs}] \times 100$$

The difficulty inherent in calculating the ROI for an investment arises from the problems associated with identification of all the benefits received and all the costs. ROI may be calculated for any time period; but when making investment decisions, calculate ROI for the total life of the investment. Benefits then include all direct and indirect benefits received from an asset over that asset's life. Some examples of benefits to include are:

- Personnel Cost Savings
- Productivity Increases
- Maintenance Cost Avoidance
- Supply Cost Reduction

Cost must be determined for the same period as benefits. Life cycle costs are all direct and indirect costs associated with the procurement of an asset, plus the continuing operations and maintenance cost for the asset over its life cycle. Examples of total life cycle cost include (but are not limited to):

- Consulting Fees
- Purchase of Equipment
- Purchase of Software
- Personnel Labor
- Annual Maintenance Cost
- Training

ROI analysis is incorporated in the CBA form in the CTP.

2.5.2 Comparison Matrix

Selection of a recommended solution is based on the comparison of how well each solution meets the same established criteria. Compare only the criteria used in the analysis of the solutions. Various techniques can be used in making this comparison. Such techniques include pro versus con comparison, plus or minus comparison, and numerical grading or ranking in a matrix format. A decision table utilizing any of these techniques is included as part of the BCAA form.

The matrix table in Figure 2.3 below utilizes the numerical rating method, and is similar to the matrix found in the BCAA. The numerical method uses a rating scale of 1-5 for the criteria evaluated. In Figure 2.3 the following criteria is used: Business Process Impact, Technical Feasibility, Maturity of Solution, Resources Required, Constraints Impact, Cost Benefit Analysis, Return on Investment, Other. A rating of 1 equates to Very Poor meaning the solution minimally meets the required level. A rating of 5 equates to Very Good meaning the solution exceeds the required level. The values of 2, 3, and 4 equate to varying levels of meeting the established criteria. Solutions that meet the required level will get a 3, while solutions just below the required level get a 2. A 4 is given to those just above the required level.

If any specific criterion is critical, weighting each criterion with a numerical factor will give an increased value to the scores for those criteria. It is best to weight only the most important criteria. Simple multipliers like 2 or 3 are best for this purpose. For example, a factor of 2 is applied to the criterion of ROI and a particular solution scores a 3 for ROI, the weighted score is 3×2 or 6. Once the scores are entered, the project manager sums the values and the solution with the largest value typically becomes the recommended solution.

Decision Criteria	Solutions						
	S1	S2	S3	S4	S4	S5	etc.
Business Process Impact							
Technical Feasibility							
Maturity of Solution							
Resources Required							
Constraints Impact							
Cost Benefit Analysis							
Return on Investment							
Other							
Total Score							

Rating Scale is: 1 = Very Poor, 2 = Poor, 3 = Fair, 4 = Good, 5 = Very Good

Figure 2.5.2: Example Matrix for Comparing Solutions

If the highest rated solution is not the recommended solution, it is important to provide the rationale for selecting a lower ranked solution. The explanation should identify the overriding factors that caused the solution to be selected. The BCAA form is meant to assist in the analysis process. The BCAA form provides an area for signatory approval.

2.6 Project Charter

While the Business Case and Alternatives Analysis process is important to the Project Initiation Phase, the project charter is the formal proposal to undertake a specific project with a specific solution. The goal of the project charter is to provide a concise summary of information for project review and decision-making during project initiation.

2.6.1 Elements of the Project Charter

The person who prepares the project charter does not need to be a Project Manager; it can be prepared by anyone. The charter will:

- Designate the Project Manager and identify the principal individuals who may be contacted for information regarding the project
- State the business purpose for the project
- Identify the project business objectives
- Identify core business activities affected and the impact of the project on them
- Describe the project including the project approach, the recommended solution, customer(s) served and expected benefits
- Verify the consistency of the project with the Commonwealth and Agency Strategic Plans and Enterprise Architecture Domain Standards
- Estimate the project development schedule including major milestones
- Develop a financial estimate to complete the project
- Accommodate approval of the project charter as needed

A Project Charter form is found in CTP.

2.6.2 Project Charter Development

The project charter is prepared from information provided in the project Business Case and Alternatives Analysis form. During preparation of the project charter, the information developed during project analysis should be refined and structured to formally present the recommended project solution. Occasionally, more research and additional development is required to complete the charter.

Some of the various methods that may be used to develop the additional information are:

- Brainstorming sessions
- Request for Information (RFI)
- Vendor demonstrations
- Formal executive meetings
- Stakeholder meetings
- Interviews with subject matter experts

2.6.3 Project Charter Document Review

There may be times when the project charter must be reviewed by the project team and other stakeholders. These reviews provide a forum for information exchange and are often timelier than written question-and-answer. Once all reviews are completed, the project charter is presented to the decision maker or decision-making body for a determination on whether the project will go forward. If the project charter is approved, the project charter is completed and signed.

2.7 Procurement Plan

Procurement planning is the process of identifying and planning for the purchase of products, goods, and services required by a project. In general, procurement planning deals with the following:

- Identifying the products, goods or services being procured
- Selecting the procurement method
- Identifying the quantities of the products, goods or services being procured
- Identifying when and where procured products, goods or services must be delivered
- Defining the procurement schedule for each step of the procurement methodology selected

2.7.1 What to Procure

It is not common for an organization to internally create or supply all the products, goods, and services necessary to complete a project. Typically, an organization purchases the products, goods, or services from an external source or enters into a contract with an outside vendor to develop the products, goods, or services. The project resource plan and project budget plan are key inputs to the identification of what needs to be procured. The specifications associated with the products, goods or services being procured also impact the selection of the procurement method.

When developing the procurement plan, the project manager and project team must determine the following:

- How does this product, good, or service meet the needs of the project and the organization as a whole?
- Does the product, good, or service already exist within the organization?
- Is there a service provider available in the marketplace for the product, good, or service?
- Does the organization have the means (staff, money, contract, etc.) to produce or to acquire the product, good, or service?

Using the questions above as a guide, the project manager and team identify the products, goods, and services to be procured for support or completion of the project.

2.7.2 Selecting a Procurement Method

After the decision is made to purchase an information technology product or service, a procurement method must be selected. Key inputs to the selection of the best procurement method include project budget, project schedule, and the project's complexity, risks and

requirements. Refer to VITA's IT Procurement Manual "BUY IT" at (<http://www.vita.virginia.gov/scm/default.aspx?id=5522>) and VITA Supply Chain Management's Policies located at (<http://www.vita.virginia.gov/scm/default.aspx?id=3664>).

Depending on the IT procurement's category, complexity and value, procurement methods available to state agencies include purchases from VITA's statewide contracts located at (<http://www.vita.virginia.gov/procurement/contracts.cfm>), purchase orders, or other competitive and non-competitive methods as discussed in the "BUY IT" Procurement Manual.

2.7.3 Quantities Procured

The quantities procured are derived from the needs of the project. Consideration must be given to the following questions:

- Is there need beyond the immediate project for this product?
- How much of the budget is allocated for this product?
- Is the need for the product defined so the agency knows exactly how much of the product, good, or service is required?

Underestimating or overestimating the quantity or cost of products, goods, and services will have a negative impact on the project budget.

2.7.4 Procurement Delivery

Identifying when the project team needs the products, goods, or services and where the products, goods, or services will be used by the project team impacts when and where the products, goods, or services will be delivered. The project schedule will drive this decision. If the required item(s) are not available, the project may be delayed and additional cost or project failure may result. The project schedule and risk plans should reflect the required delivery dates and the risk associated with the procurement.

2.7.5 Procurement Schedule

The schedule of the procurement activities is determined by the selected method of procurement and the project schedule. Each procurement method has different requirements, and the time line to procure materials and services will vary accordingly. Backward planning is the best technique for establishing a schedule for procurement activities. Once the procurement method is selected, use the procedures identified in the Code of Virginia and by the appropriate procurement authority to develop a schedule for performing the required procurement procedures.

2.8 Project Charter

The project charter formally communicates the existence of the project. While the Business Case and Alternatives Analysis process is important to the Project Initiation Phase, the Project Charter is the formal proposal to undertake a specific project with a specific solution. The goal of the project charter is to provide a concise summary of information for project review and decision-making during project initiation. Approval of the project charter marks the end of the Project Initiation Phase and the beginning of the Detailed Planning Phase.

The project charter is the basis for Detailed Planning, appoints the project manager, and authorizes the expenditure of resources. The project charter is prepared from information provided in the project Business Case and Alternatives Analysis. During preparation of the project charter, the information developed during project analysis should be refined and structured to formally present the recommended project solution. Occasionally, more research and additional development is required to complete the charter.

Some of the various methods that may be used to develop the additional information are:

- Brainstorming sessions
- Request for Information (RFI)
- Vendor demonstrations
- Formal executive meetings
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- Interviews with subject matter experts

There may be times when the project charter must be reviewed by the project team and other stakeholders. These reviews provide a forum for information exchange and are often timelier than written question-and-answer. Once all reviews are completed, the project charter is presented to the decision maker or decision-making body for a determination on whether the project will go forward. If the project charter is approved, the project charter is completed and signed. A Project Charter form and instructions are found in CTP to assist in the development of the project charter.

2.8.1 Project Charter Components

The project charter is the final product of the Initiation Phase. The major sections of the project charter are:

- General Information
- Project Purpose
- Project Business Objectives
- Project Scope, Schedule and Budget
- Project Authority
- Project Organization
- Management Review
- Resources
- Signatures

2.8.2 Project Purpose

The purpose of the project is to solve a business problem. In this section of the project charter, the business case is summarized at a very high level. The business rationale for the project is explained.

2.8.3 Project Business Objectives

This area defines the specific business objectives of the project and relates the objectives to key business initiatives or critical business issues defined by the organization in the Agency IT Strategic plan. The project charter communicates these objectives to ensure that all stakeholders understand the business issues the project addresses. During the planning phase, these objectives serve as a foundation for development of measures of success.

2.8.4 Project Scope

The project charter documents the scope of the project. Project Scope is defined as the sum of the products and services provided by a project. In other words, the scope establishes the boundaries of a project. The project scope addresses who, what, where, when, and why of a project. Section 3, the Project Planning Phase, addresses detailed analysis and further refinement of the project scope. The project scope developed here should reflect as much information as possible to clarify what deliverables are included in the project and, of equal importance, what is not included in the project. While the project scope may be further refined in the detailed planning process or even during project execution, the scope approved in the project charter is the approved limit for the project. Any subsequent changes made to the project scope in other phases of the project life cycle are managed through the formal baseline change process.

2.8.5 Project Authority

The project charter defines the authority and mechanisms to resolve potential problems. Three areas are addressed:

1. The level of management issuing the project charter is identified. A level of management that can allocate organizational resources to the project and have control over the project elements issues the project charter.
2. The project charter appoints the project manager and grants him the authority to plan, execute, and control the project.
3. The project charter establishes a relationship between the project manager and senior management to ensure support mechanisms exist to resolve issues outside the authority of the project manager.

The project charter is a pseudo-contract between senior management and the project manager; both have duties and obligations to the project. The project charter form provides an approval tab, where the appropriate acknowledge agreement and approval of the project as chartered.

2.8.6 Project Organization

This section calls for a graphic and text description of the project team. It should depict the type of organization used for the project team, its makeup, the lines of authority, and definition of the responsibilities of project stakeholders, including those not under the authority of the project manager. For example, this section might identify functional managers and their roles in implementing and supporting the project.

2.8.7 Resources

The full scope of resources required to execute a project is usually unknown when the project charter is developed. However, the project charter does need to indicate what resources the management plans to make available to the project. This includes people, facilities, equipment, and funding.

2.8.8 Project Initiation Transition Checklist

The Project Initiation Transition Checklist is a tool to verify that necessary steps have been completed and establishes the exit criteria from the Initiation phase. The transition checklist focuses on completion and approval of the project charter and supporting documents.

2.9 Next Step – Detailed Planning Phase

After establishing the project charter, the project team begins the process of devising and maintaining a workable scheme to accomplish the project solution. Section 3 of the CPM methodology, the Detailed Planning Phase, integrates techniques, tools, and skills to map the project course through development of a project plan.

Section 3. Planning Phase

Project planning is the process of defining an orderly arrangement of activities and resources to deliver a unique product or service. The project plan is the primary artifact developed during the planning phase and communicates project activities in terms of: what tasks will be performed; who will perform the tasks; when will the tasks be performed; what resources will be applied to accomplish the tasks; and how the tasks will be sequenced. Time spent developing the appropriate structure for organizing and managing project activities improves performance in the Execution and Control Phase. Figure 3.1 depicts the components of Commonwealth Project Management, as discussed in Section 1. The Detailed Planning Phase begins after approval of the project charter and concludes with approval of the project plan.

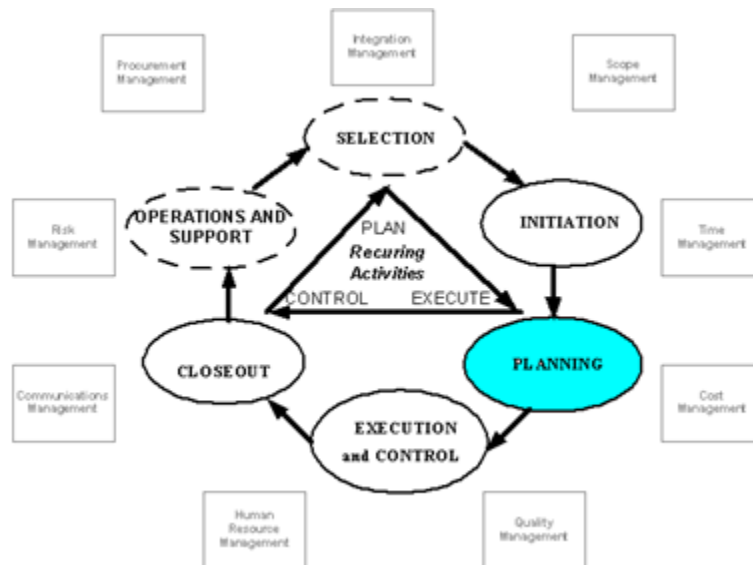


Figure 3.1 Project Management Knowledge Areas, Lifecycle, and Recurring Activities

3.1 Activities and Documentation in the Planning Phase

The project plan is actually a combination of numerous component plans that are developed during the Detailed Planning Phase. For each plan deliverable, a more detailed description is provided in this section.

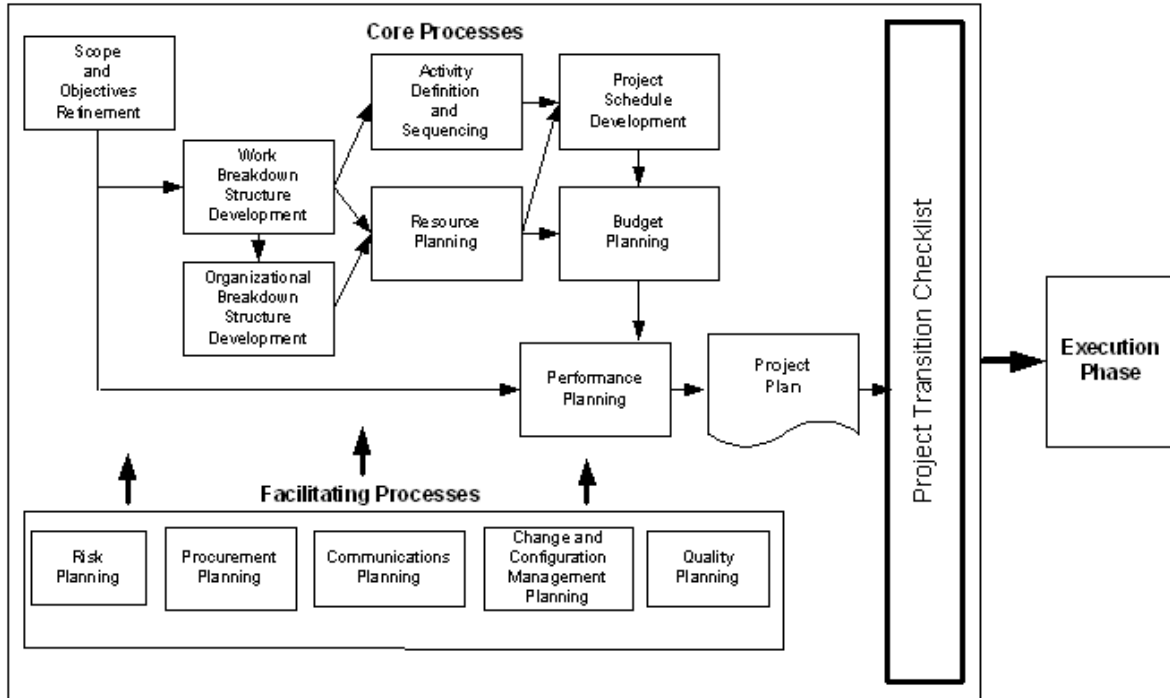


Figure 3.2 Planning Processes

Execution of the Core Processes begins with the review and refinement of the project scope and objectives found in the project charter. From the refined Project Scope and Objectives, the Work Breakdown Structure (WBS) is built. The WBS is a deliverable-oriented grouping of project components that organizes and defines the total scope of the project. The WBS becomes the foundation for development of the Organizational Breakdown Structure (OBS), the sequencing of activities, and the development of the Resource Plan. Development of the Resource Plan also requires input from the OBS. The OBS defines the organizational units responsible for a specific project component or task, and the Resource Plan identifies the specific resources, which will be allocated to the project component or task. Project Schedule development is dependent on input from the Resource Plan and activity sequencing processes. The Project Schedule provides a representation of predicted tasks, milestones, dependencies, resource requirements, task durations, and deadlines. The Project Schedule and Resource Plan provide input to the budget planning process. The Budget Plan identifies the available funding and costs associated with a defined set of activities during a specified time period. Finally, the performance planning is developed with input from the refined scope and objectives and the Budget Plan. The Performance Plan defines how the project success or failure is measured.

The Project Management Guideline includes a methodology for performing each activity.

3.2 Project Plan

The project plan is used to guide execution and control of the project. It forms the basis for all management efforts associated with the project. The project plan can also be used to communicate with project stakeholders and gain support and understanding of the project. The Project Manager and project team develop the project plan through execution of the project planning processes and present the plan to management for approval.

What is a Project Plan? A project plan is a formal, approved document that is used to guide both project execution and project control. (PMBOK)

Information documented in the project plan evolves as the project moves through multiple iterations of the planning process. Changes made to any component of the project plan can affect other plan components and thus requires the review of all planning documents. The main body of the project plan provides a summary of the project plan with details provided in appendices that represent specific components of the project plan. The project plan should include the following:

- Project Plan Summary
- Project Performance Plan
- Work Breakdown Structure
- Resource Plan
- Project Schedule
- Project Budget
- Risk Plan
- Communications Plan
- Change and Configuration Management Plan
- Quality Management and IV & V Plan

Note: The CPGA Risk and Complexity Assessment provides guidance and requirements for which Commonwealth Portfolio Tool (CPT) forms are required for projects in each Project Category.

3.3 Project Plan Components

The project planning activities and resulting Project Plan components are described below.

3.3.1 Project Scope and Objective Analysis

The scope and objectives of the project were defined at a high level in the project initiation phase. The Project Manager and team members developing the project plan may not have been involved in the project initiation phase. Before project plan development begins, the Project Manager and team must develop a thorough understanding of the project scope and the project objectives.

A detailed project scope identifies:

- What the project deliverables are
- Where, when, and to whom the deliverables are distributed
- What process or technology solution is proposed
- Who (group, organization, or key person) performs the work
- When and where the work is performed
- When, where, and to whom the project will deliver the intended product or service

Project objectives are the desired outcome of a project and should align with the business needs of the organization. The project objectives are directly related to the deliverables described in the scope and to business objectives described in the project charter. The project charter presents the project objectives in relation to the organization's strategic plan. The project objectives should be refined to facilitate development of detailed project plans. Ultimately, project objectives represent the criteria used to determine success or failure of the project.

3.3.1.1 Project Scope Refinement

Aligning information provided in the Project Charter with the topic headings provided in the Project Scope and Business Objectives Worksheet refines the project scope. Each element of project scope information from the Project Charter should be reviewed and refined to a level that provides a specific, clear, and concise statement of fact. This list of facts provides a clearly defined framework within which the project will be planned and executed. When refining the project scope, it is essential that the Project Manager communicate any concerns about the project scope to the Project Sponsor. The Project Sponsor should assist the Project Manager by answering questions about the scope and clarifying any ambiguous statements in the project charter.

3.3.1.2 Project Objectives Refinement

At this point in the planning process, the objectives provided in the project charter are reviewed and refined to provide a clear understanding of the desired outcomes of the project. A business objective is defined as a desired result produced by a project that answers or resolves a business problem. The Project Manager must determine how successful completion of an objective is measured. If the objective includes more than one outcome or is too broad to measure, divide the objective into parts that contain only one measurable outcome.

3.3.2 Work Breakdown Structure

A Work Breakdown Structure (WBS) is a hierarchical representation of all the discrete products, services, activities, tasks, and subtasks that comprise a project. The WBS represents the total scope of the project. Work not identified in the WBS is outside the scope of the project. Using a WBS, the project scope is broken down into progressively lower levels of detail. The lowest level of the WBS is a work package. The work package is a task or activity that can normally be completed in 80 hours or less.

Each level of the WBS is referred to as a tier. Tier I represents the highest level of the WBS.

Example: Tier I. Project Management

Tier II. Project Plan

Tier III. Project WBS

Project Resource Plan

Project Schedule

Project Budget

Example 3.3.2: Work Breakdown Structure Development

3.3.2.1 Develop Tier I of the WBS

Typically, the scope described in the project charter is the basis for defining the first tier of activities in a WBS. Tier I activities are the major project activities identified as deliverables in the project scope.

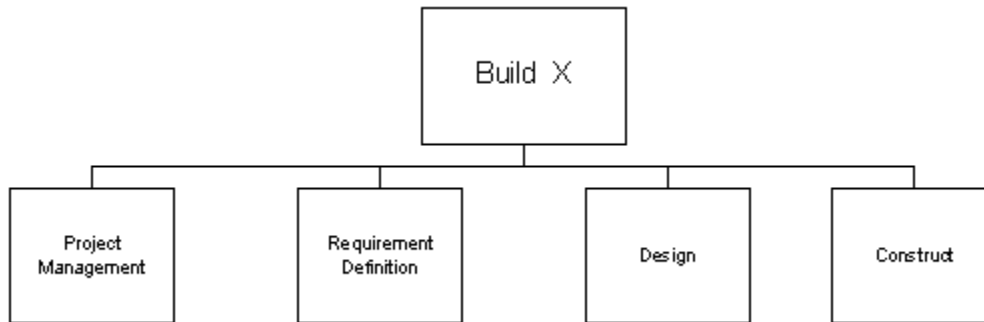


Figure 3.5 WBS Tier I

3.3.2.2 Assign High-Level Responsibility

On large projects, it is often difficult for a single person or group to develop the WBS. In such cases, when defining the first tier of the WBS, the Project Manager should identify the organization or person responsible for each Tier I activity. Those responsible can then assist with the decomposition of the Tier I deliverables. Assignment of responsibility for high-level WBS activities ensures management is responsible for the entire project scope.

3.3.2.3 Decompose WBS

The WBS is decomposed into discrete tasks or work packages to be accomplished during the project. A project WBS normally is decomposed to at least three levels or tiers of tasks. Projects are decomposed to a level that represents a distinct package of work. Distinct work packages are characterized by the following:

- A discrete product or service is identified
- Responsibility for the element can be assigned to one person or functional group
- Scope is clearly understood
- Cost is reasonably estimated
- The element is manageable (normally not more than 80 hours of work)

3.3.2.4 Assign Responsibility to Elements

After the WBS is decomposed to the lowest level (the work package), responsibility is assigned for each element. Individuals assigned to an element are responsible for planning, controlling, and executing the specific task.

3.3.2.5 Define WBS Elements

A collection of activity, task, and subtask descriptions is referred to as a WBS dictionary. The purpose of the WBS dictionary is to clearly describe each element of the WBS to facilitate planning and management of the element. The description includes what is to be delivered, attributes of the product or service delivered, and, in some cases, what is not included within the element. Defining what is not included ensures that the responsible individual does not allow additional scope to be added to the project. The WBS dictionary can be used to communicate scope to contractors or subcontractors, often forming the basis for a statement of work. The WBS Table Template provided as a link in CTP allocates one column to the definition of the WBS elements. Alternately, Microsoft Project software can facilitate and capture a WBS, and is sufficient to fulfill the WBS documentation requirement.

3.3.2.6 Review and Approval of the WBS

Management, as identified in the project charter, reviews and approves the WBS. This step ensures management is committed to the project and understands the total project scope. The WBS may be approved when the project plan is approved; however, it is prudent to review the WBS with the Project Sponsor or Program Manager before continuing development of the project plan.

3.3.2.7 Baseline the WBS

A baseline is defined as the original plan for a project plus or minus approved changes. When the WBS is approved, it becomes the WBS baseline. Changes to the WBS baseline are controlled through a defined change control process addressed later in the methodology.

3.3.2.8 Work Breakdown Structure Format

The WBS is simple in its intent but can be elaborate in its presentation. A WBS may be a simple list of activities or a detailed spreadsheet of tasks and subtasks. The WBS Table provided in this methodology is in table form and captures key information about the activities, tasks, and subtasks of the project. Another example of a WBS (in a graphical representation) is shown in Figure 3.6. Project Managers may choose to use automated tools like Microsoft Project, which will allow development of a WBS in a list format associated with a schedule.

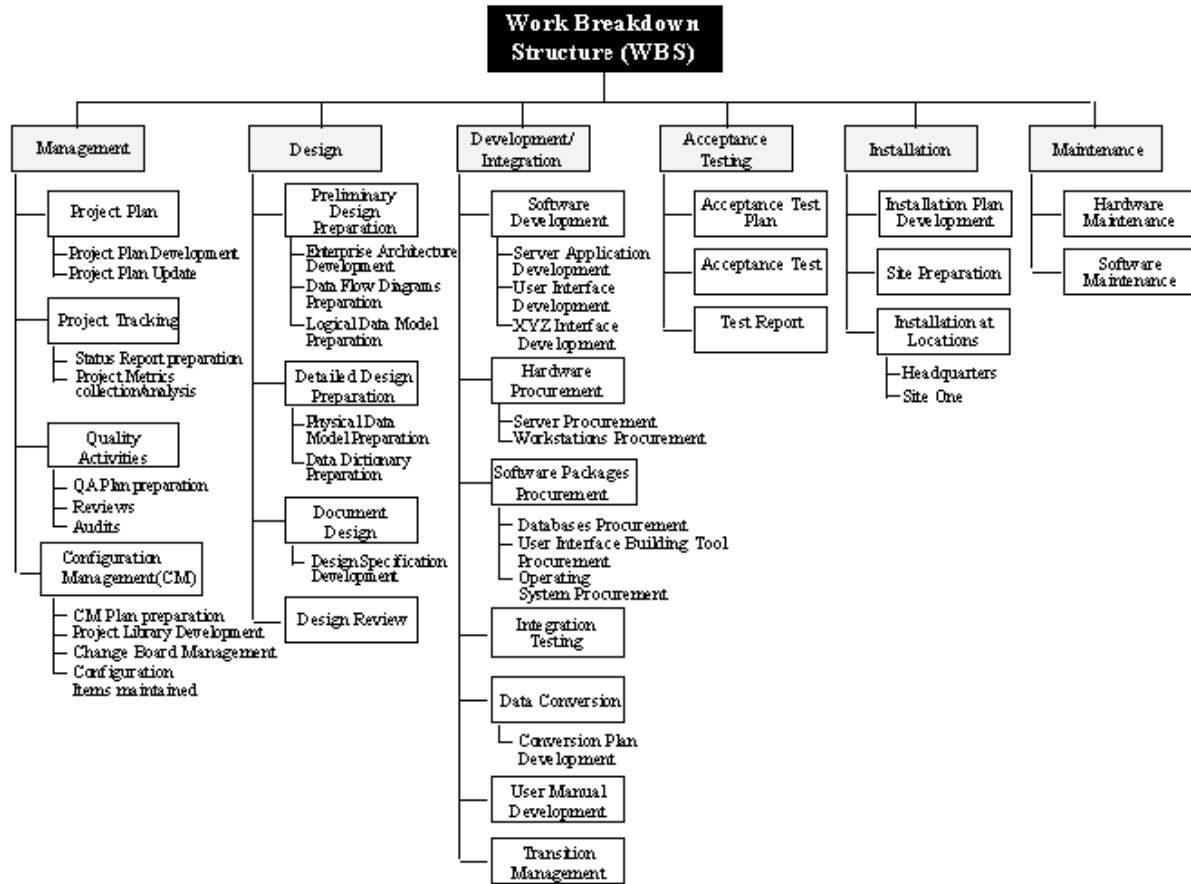


Figure 3.6 Hierarchical Work Breakdown Structure in Tree Format

3.3.2.9 Helpful Hints for Developing the Work Breakdown Structure

- **Product and Service Orientation:** The WBS is derived by refining the scope of a project and is focused on the products and services the project team will deliver. The project will, in all likelihood succeed, if management focuses attention on the individual products and services being delivered. Schedules focus on how a product or service is delivered. By design, schedules focus on activities and actions characterized by a verb-noun format. Products and services are not verbs. Therefore, verbs do not belong in a WBS. When verbs are used in the WBS, there is a tendency for management to focus on how the project is being delivered instead of the products and services being delivered.
- **Simplicity:** Defining the scope of a project can be difficult even for simple projects. As a management tool, WBS size is important. If the WBS is too large, it can be a management burden. Many WBSs are more complex than the project demands.
- **Coding Scheme:** Many projects are complex and require automated tools to assist in managing and reporting project information. A WBS, because of its hierarchical nature, requires that a parent-child (hierarchical) relationship be established and captured for automated reporting. To achieve the parent-child relationship, a coding scheme is used to identify each element. The simpler the coding scheme the better. The identification codes should not be assigned until the WBS is stable. This eliminates the use of complex schemes and the need to reassign codes due to changes in the WBS. As shown in the simplified example below, a WBS is a family tree of related deliverables that comprise the project.

Project XYZ Work Breakdown Structure:

- 1 CMS Project
 - 1.1 Project Management
 - 1.2 Communications
 - 1.3 Documentation
 - 1.4 Hardware
 - 1.5 Software
 - 1.6 Systems Engineering
 - 1.7 Facilities
 - 1.8 Training

3.3.3 Organizational Breakdown Structure

An Organizational Breakdown Structure (OBS) is a representation of the WBS from an organizational perspective. The OBS is an organization chart that relates WBS work packages to organizational units. The hierarchical nature of the OBS provides the ability to aggregate project information to higher levels until the top level is reached. The OBS ensures all project elements are assigned to a responsible organization.

3.3.3.1 Organizational Breakdown Structure Format

Like the WBS, an OBS can be represented in a diagram or table. Both structures represent hierarchical relationships. The OBS is not included as an appendix to the project plan however; development of an OBS facilitates the process of planning organizational workload and resource and fund allocation. The CTP-linked template provided with this methodology is based on a table format. Alternately, Microsoft Project software can facilitate and capture an OBS, and is sufficient to fulfill the OBS documentation requirement. An example of the diagram format is provided below.

3.3.3.2 Organizational Breakdown Structure Diagram

The OBS should be coded in a hierarchical (parent-child) manner to achieve aggregation from lower to higher-level organizational elements. Project components such as tasks, costs, and risks, can then be related to the OBS in order to assign organization responsibility for the components. The OBS can be then be used to display a variety of management information. The figure below is an example of budget information contained within a WBS and displayed functionally.

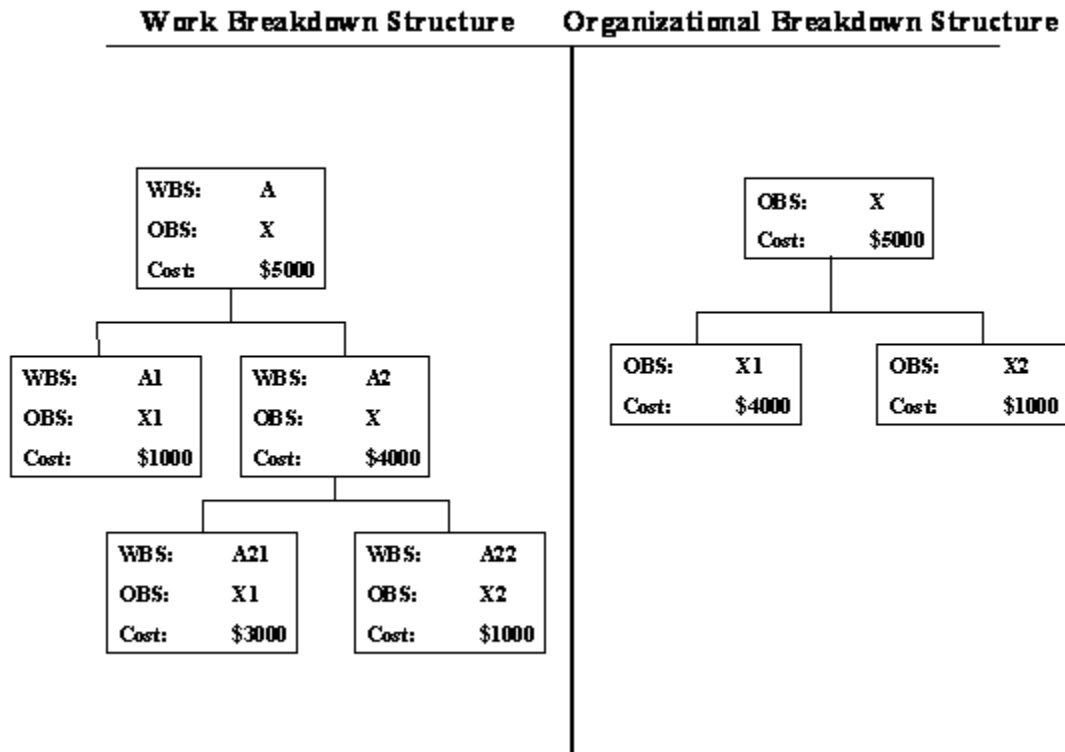


Figure 3.3.3.2 Work/Organizational Breakdown Structure Budget Comparison

3.3.4 Activity Definition and Sequencing

The process of defining and sequencing activities and tasks represents a further refinement of the WBS. Activity sequencing involves dividing the project into smaller, more manageable components, specifying the order of completion, and identifying the dependent relationships between activities and tasks.

3.3.4.1 Defining Project Tasks

Use the WBS to identify the specific tasks necessary to accomplish the project objective. The WBS definition of the activity and task description is usually a general description that should be further refined in this step of the Detailed Planning process. The accuracy of the project schedule will increase in proportion to the level of detail reflected in this process. An unambiguous and detailed definition for each task will provide sufficient clarity to estimate duration, identify dependencies, and establish the correct sequence.

3.3.4.2 Duration Estimation

The project team must estimate the duration of the listed activities. Duration is the amount of time required to complete the defined task. The estimated duration combined with resource planning information and task relationships will define the Project Schedule. There are several techniques available to estimate task duration. The most common technique relies on historical experience. Collected and archived historical project data can be used in this estimation. Historical records greatly enhance the accuracy of duration and cost estimates. Additionally, data based on staff skills are far more valuable than generalized

industry estimates. If historical data do not exist, seek the advice of experts and others who have completed similar tasks. Obtain estimates from multiple sources, compare the results, and estimate the duration based on the multiple inputs.

The duration of tasks (e.g., year, month, week, day, or hour) should be consistent with the amount of detail tracked and the risk associated with the task. Often tasks become so detailed that they become a checklist. In a complex project, checklists and schedules should be separated to ensure that the management reporting is not compromised by too much detail.

3.3.4.3 Defining Task Relationships

The WBS denotes a hierarchy of task relationships. Subtask completion eventually rolls up into task completion, which ultimately results in project completion. There can be relationships between tasks that are not within the outlined hierarchy (perhaps from other projects). These relationships need to be noted. The ultimate structuring of the tasks should minimize horizontal dependencies on other tasks. If the tasks are not organized efficiently, it is difficult to schedule and allocate resources to the tasks. Microsoft Project software can facilitate and capture an ADS, and is sufficient to fulfill the ADS documentation requirement.

3.3.5 Resource Planning

Projects have a limited number of resources. The project charter allocates resources (at a high level) to the project. One of the Project Manager's primary roles is to find a way to successfully execute a project within these resource constraints. Resource planning involves identifying a team that possesses the skills required to perform the work (labor resources), as well as identifying the tools, equipment, facilities, and other resources needed by the team to complete the project. A Project Resource Plan form is linked into CTP.

3.3.5.1 Labor Resources

Labor resources are human resources. There are several parts to planning for the labor resource needs of a project:

- Determining the resource pool
- Estimating the skill requirements
- Identification of resource costs
- Identification of risk associated with a particular resource
- Determining the size of the project team

3.3.5.2 Determining the Resource Pool

Though the charter allocates resources to the project, specific resources may not be identified. The first step is to determine the specific resources that are available to the project. Typically, a collection of identified resources is called a resource pool. The resource pool specifies the skill type and experience level of the resources and the time period the resources are available to the project.

3.3.5.3 Estimating the Skill Requirements

Task completion time is directly related to the skill level of the person performing the task. The Project Manager must pragmatically assess the skills of the available resources. The skill level or quality of the allocated resource will drive both schedule and budget. (Less than optimal resources may slow the project and increase cost even if their rate is lower than an optimal resource.)

3.3.5.4 Costs

Identification of resource costs is essential information to development of the project budget. Resources required by the project can be charged to the project in a variety of ways. Some costs are hidden costs and are not easily identified. The cost for each resource and the unit of measure by which the cost is calculated is recorded in the resource plan.

3.3.5.5 Risk

The Project Manager must determine the risks associated with the available resources. Resource risk may include skill level availability and cost of the resource. Risks are inherently involved with scheduling resources. Sound resource planning makes allowances for dealing with risks in one or more of the following ways:

- When significant resource risks are identified, add a WBS task for risk management/risk reduction and add financial reserves to the budget to cover potential schedule delays.
- Add time to those tasks where resources are known to be a problem. There is no rule of thumb for this multiplier; it depends on the degree of risk and the overall impact resource problems can have on the project.
- Apply an additional percentage of time to the schedule for specific individuals, particularly if new technology is being used or if the person providing the estimate is extremely optimistic. Remember, technical staff typically underestimates the time required to complete tasks.
- When a skill shortage is identified, add time and resources for training. By recognizing resource shortfalls and providing the necessary training, a Project Manager mitigates some risk.

3.3.5.6 Non-labor Resources

All project teams require tools to successfully perform assigned tasks. In scheduling resources, the Project Manager must ensure that both the people and the equipment necessary to complete assigned tasks are available simultaneously.

The need for adequate workspace is often overlooked when planning a project. If a 15-person project team is going to start work, there must be a facility to house the team. Ideally, the team should be collocated in one place to facilitate interaction and communication. Team spirit and synergy are enhanced, and the chance of project success is increased when everyone works closely together.

In addition to workspace, equipment for the team should be included in the Resource Plan. Ensuring the availability of equipment at critical points in the project is crucial in planning a successful project. Efficiency and morale are negatively affected by unavailability of equipment needed to perform a task. When considering equipment it is also important to

remember to give each team member the right tools (for example computer software) to do the job from the beginning of the project

3.3.6 Schedule Development

The Project Schedule provides a graphical representation of predicted tasks, milestones, dependencies, resource requirements, task duration, and deadlines. The process of developing the project schedule follows sequencing of activities and resource planning. The project schedule should be detailed enough to show:

- Each WBS element to be performed
- Resources scheduled for each task
- Start and end date of each task
- Expected duration of each task
- Required predecessor task(s)

Developing a schedule is an interactive process. For example, Risk Management Planning may suggest additional tasks requiring further resources and the need to establish additional milestones. For large, complex projects, an overall master schedule is developed with sub-schedules for activities or task that provide additional detail necessary for management of the project.

During the life of the project, actual progress is measured against the approved schedule baseline. (A schedule baseline is defined as the original approved schedule, plus or minus approved changes.) Changes to the schedule baseline are controlled through a defined change control process addressed later in the methodology.

3.3.6.1 Schedule Development and Maintenance

Schedule development and maintenance have the following objectives:

- Developing a project schedule that displays a logical sequence of tasks to deliver the project
- Providing an accurate status of the project to control the project work effort
- Providing a means for understanding the impact of change on the schedule baseline

The figure below depicts the process to develop initial schedules and maintain schedules during the life of the project

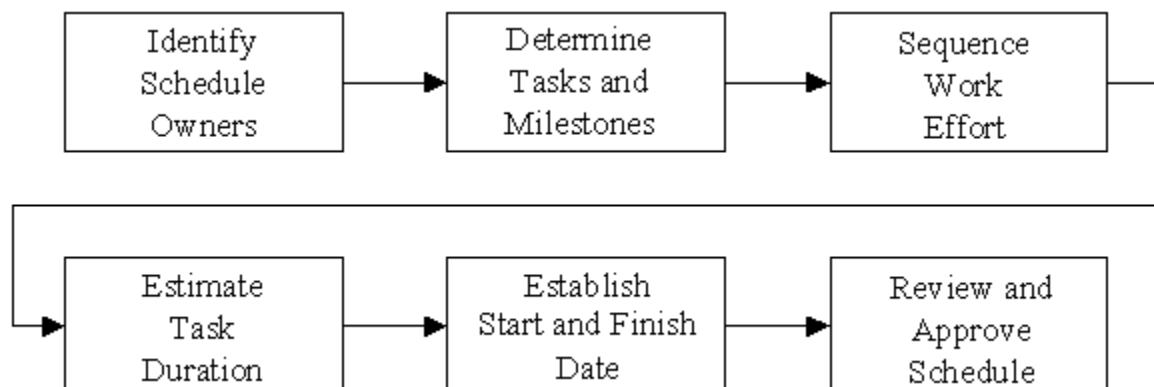


Figure 3.3.6.1: Schedule Development and Maintenance Process

3.3.6.2 Identify Schedule Owners

Development of a project schedule often requires the integrated efforts of project team members that are assigned activities or tasks to accomplish. Identifying the individuals responsible for developing and maintaining the project schedule is essential to good schedule control. The work breakdown structure, organizational breakdown structure, and resource plan are used as the basis for schedule development.

3.3.6.3 Determine Tasks and Milestones

Tasks are focused on work effort to produce a product. Milestones are a point in time used as management checkpoints to measure accomplishment. The number of tasks and milestones identified result from the specific product, the level of risk, and the level of detail required by management. The result is a listing of tasks and milestones required to deliver the product.

Milestones denote the completion of key project activities. A milestone has no duration. A deliverable is often represented as a milestone, while the effort to produce the deliverable is identified as a task. Milestones can occur at the end of each work package in the work breakdown structure and serve as measurable items on which to evaluate success of a task.

For contracted work, milestones are often used as points in the project where interim payments are made. If this approach is used, mutual agreement is necessary on the content of each milestone and the cost associated with that milestone.

3.3.6.4 Sequence Work Effort

Logically sequencing tasks and milestones to deliver a product is critical to development of a project schedule. Sequencing establishes dependencies among tasks and milestones, which must be incorporated into the project schedule. Sequencing of WBS activities and tasks is performed during activity definition and sequencing discussed earlier in this section.

3.3.6.5 Estimate Task Duration

Estimating task duration is one of the most challenging aspects of Detailed Planning. It is also a key input to cost estimation. Estimating task duration is an iterative process occurring throughout the planning phase and is directly affected by the results of resource planning. Variables that impact task duration include staff availability, complexity of the task, the skill level of the person assigned to the task, unexpected events, efficiency of work time, and mistakes and misunderstandings during the execution of the project. A skilled schedule developer takes into account absenteeism, holidays, meetings, discussions, and interaction among the staff. No staff resource is 100% productive every hour of the workday. If a schedule assumes 100% productivity, the schedule rapidly falls apart. A successful schedule developer incorporates these factors into the duration estimates.

3.3.6.6 Establish Start Date and Finish Date

After the tasks and milestones are identified, sequenced, and estimated, the start and finish dates for each task must be specified. The date a task may start is impacted by the availability of resources to perform the task and the task's dependency on other tasks. The start date of a task is derived from the date resources required to execute the task are

available and the finish date(s) of predecessor task(s). The finish date of a task is determined by adding the estimated task duration to the start date.

3.3.6.7 Review and Approve Schedule

The final steps in schedule development are reviewing the schedule to ensure it represents the most effective and efficient work effort and approving the schedule. The schedule developers may review the schedule multiple times before it is reviewed and approved by the Project Manager. Finally, the schedule is submitted as part of the project plan to the designated approval authority.

3.3.6.8 Other Helpful Hints for Project Schedule Development and Maintenance

- Templates and Historical Information: Use schedule templates or historical information as the basis for schedule development, if applicable. Schedule templates and historical information can provide valuable insight about tasks that otherwise may be overlooked. The use of appropriate historical information can strengthen the cost and schedule estimates for resources.
- Define Priorities: Clearly defining the priorities of the project tasks will help resolve scheduling or resource conflicts. Understanding the priorities and relationships between the tasks will further assist with schedule and resource conflict resolution.
- Determine Critical Path: The critical path becomes apparent as the schedule is developed and refined. When the schedule is complete, the critical path will be the longest path of sequential tasks that must be performed in the precise order scheduled. The critical path must be carefully managed or the entire project will be delayed. The sequence and schedule are driven by task dependencies. The critical path identifies the earliest possible completion of all project work. Because there is no float time available on the critical path, the schedule cannot slip. In order to manage the project, the critical path is identified in the project schedule and the Project Manager remains aware of the importance of the critical path throughout project implementation.
- Document Assumptions: Documenting the assumptions made when developing the project schedule is critical to the success of the project. Modifying the schedule without clear understanding of all assumptions made during schedule development adds substantial risk to the project. An example of an assumption that should be documented would be if the task duration for a specific task were relatively short because it was assumed a highly skilled person would perform the work. If a less skilled person is assigned to perform the task, the Project Manager can recognize the risk and make necessary schedule changes and decisions.
- Identify the Risks: Risks are inherently involved with scheduling limited resources. Good scheduling makes allowances for risks in one or more of the following ways:
 - When significant schedule risks are identified, add a WBS task for risk management/risk reduction. If possible, add financial reserves to the budget to cover potential schedule delays.
 - Add additional time to those tasks where schedule risks are apparent. There is no rule of thumb for this multiplier; it depends on the degree of risk and overall importance of the schedule to the project.
 - Apply a percentage of time to the schedule for specific individuals, especially if new technology is being used or if the person providing the estimate is extremely optimistic. Remember, technical staff typically underestimates the time required to complete tasks.
- One Start—One Finish: A useful schedule is structured so that it provides management with a tool to understand the impact of an issue on the project completion. To accomplish this, the tasks within the schedule must be constrained

(have dependencies between them) so that impacts can trickle through the schedule, and the effects of the issue can be seen. Therefore, a schedule should have only one task that starts the schedule; for example, "begin project." All other tasks are then constrained to the first task or subsequent ones. The schedule should have only one task that completes the project; for example, "project complete." No task should be entered into the schedule without affecting something. The constraints or dependencies should be realistic.

- Descriptions: Schedules are displayed to many people within and outside the project. All potential recipients of schedule information should understand the descriptions of tasks and milestones. Cryptic or abbreviated descriptions should be avoided.
- Task Responsibility: The schedule owner is usually a manager. The individuals performing the project tasks are usually not managers. To facilitate communication, a person responsible for completing each task should be identified. This improves communication between the individual performing the task and the schedule owner. The individual is provided with a list of tasks to be completed, and the schedule owner has a point of contact to obtain task status. Identifying the person responsible makes it possible to produce reports for each person.
- Summary Tasks: A group of tasks can usually be combined to represent some aspect of the project that is important to management; for example, the schedule to deliver a WBS element or a particular phase of the project. Automated scheduling tools have the capability to define summary tasks, often referred to as hammocks, which allow tasks to be grouped. Task grouping improves communication and provides a framework to display summary information to upper management.
- Management Concurrence: Usually the Project Manager and technical representatives of the project develop the schedule. However, management is typically the prime recipient of schedule benefits. Therefore, all management levels should understand the schedule. Management must concur with, own, and use the schedule as a tool to manage the project. Without management ownership, project performance may be less than optimal.
- Simplicity: Developing and maintaining project schedules is difficult and time-consuming. Frequently, schedules are developed and never maintained to reflect current status. This may be due to a lack of discipline or the time-consuming process inherent in scheduling. Additionally, risk should be a factor when determining the degree of rigor required for project schedules. Areas with a high degree of risk may require a greater degree of schedule control. Areas with a low degree may not require the same rigor. Simplicity may be the best approach. Schedules should be developed to enable project participants to understand the delivery of the entire project. First developing schedules at a high level and then defining detailed schedules for high-risk areas should satisfy the need for improved control with reduced burden.
- Automation: Schedules provide invaluable information to the management of a project. Automation can offer the means to improve reporting to management. Automated scheduling tools are commonplace in today's project environments. The Commonwealth of Virginia has adopted Microsoft Project for this purpose.

3.3.6.9 Schedule Format

The type of schedule format used for a project relates to the complexity of the implementation. For large, complex projects with a multitude of interrelated tasks, a Network Logic Diagram (commonly referred to as a PERT chart ((Program Evaluation and Review Technique) may be used. The Network Logic Diagram depicts interdependencies and associations and allows planning to include these relationships. A key feature of this method is the ability to determine and to show the critical path of the project (see below for a discussion of critical path). A sample Network Logic Diagram is shown in below.

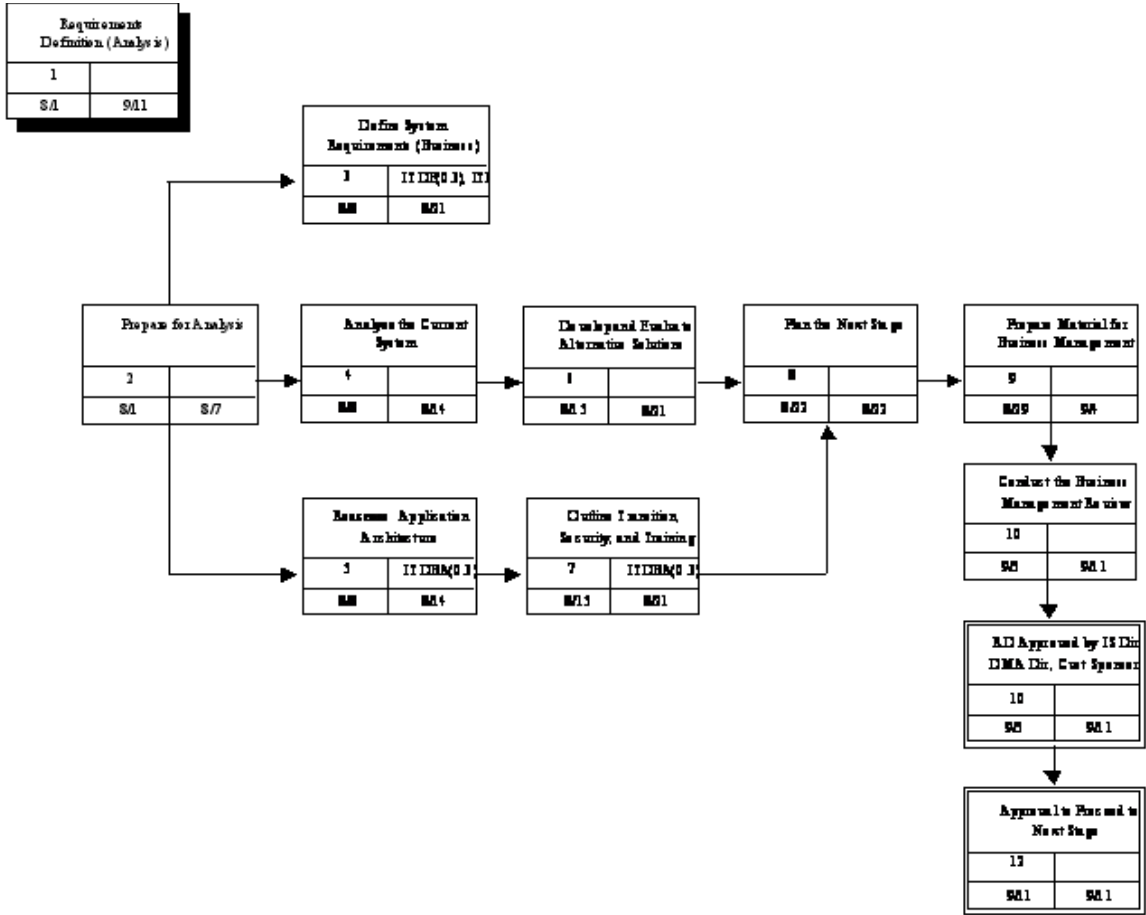


Figure 3.3.6.9a: Sample Network Logic Diagram

A Gantt chart is another frequently used method to display a schedule. The Gantt chart (or bar graph, named after Henry Gantt) is a two-dimensional representation showing tasks and the time frame for completion. A sample Gantt chart is shown below.

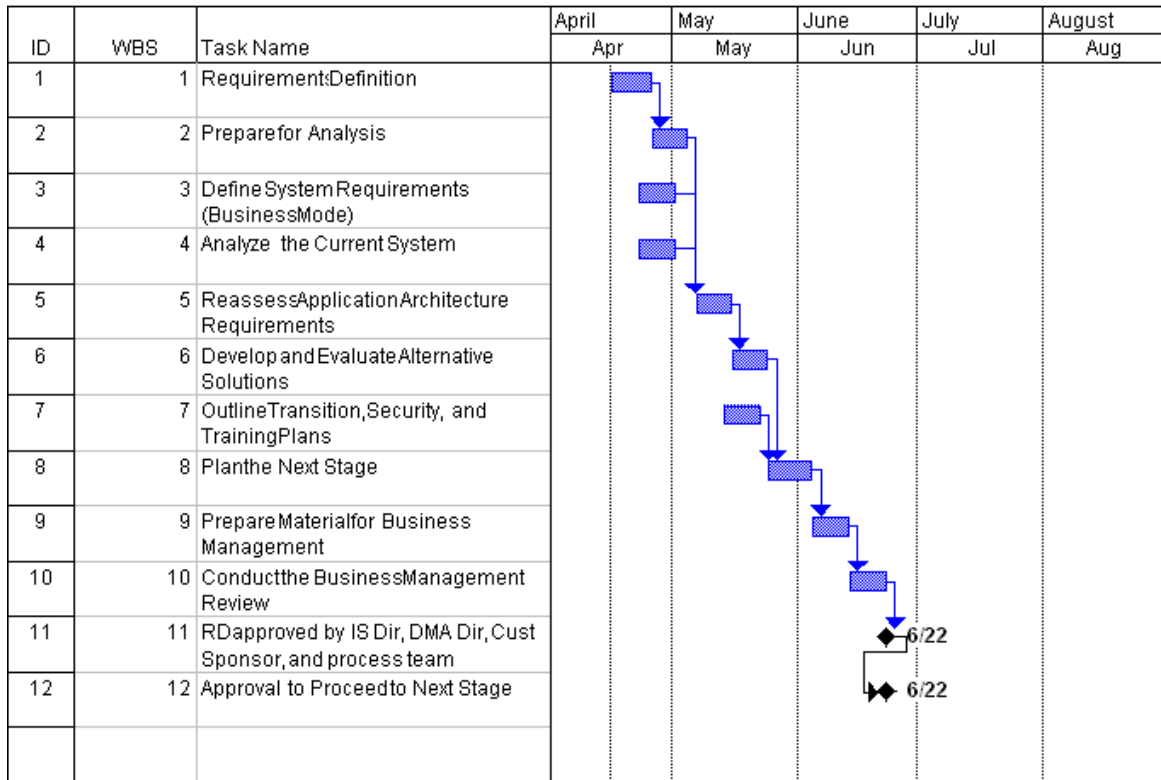


Figure 3.3.6.9b: Sample Gantt Chart

The simplest display of a schedule is the table format. Other displays such as Gantt and Pert charts can be developed from the table format. Microsoft Project and other automation tools can also be used in a similar manner by developing the schedule in a table format and then using the automated tool to visualize the table in a Gantt chart or Network Diagram.

3.3.7 Budget Planning

Budget planning is the determination of the estimated costs and available funding associated with a defined set of activities during a specified time period. The steps associated with budget planning are highly dependent on both the estimated duration of tasks and the resources assigned to the project. The Budget Plan is dependent upon the project schedule, the resource plan, the quality management plan and the independent validation and verification plan, and the risk management plan.

3.3.7.1 Overview of Project Budget Planning

Initial budgetary estimates from the project charter are based on availability of funds and gross estimates of project costs. The availability of funds may or may not coincide with the actual funding needed to execute the project. For this reason, budget estimates are refined in the Detailed Planning Phase and baselined with approval of the project plan.

Budgeting serves as a control mechanism where actual costs can be compared with and measured against the baseline budget. When a project schedule begins to slip, cost is affected. When project costs begin to escalate, the Project Manager should revisit the Project Plan to determine, whether the scope, budget, or schedule needs adjusting.

3.3.7.2 Cost Factors and Estimate cost for WBS Elements

To develop the budget, the applicable cost factors for each WBS element must be estimated. The cost factors are:

- Internal Staff Labor Cost
- Services (External) Cost
- Development Tool Cost
- Software Tool Cost
- Hardware Cost
- Materials and Supplies
- Facilities
- Telecommunications
- Training
- IV&V
- Contingency

A cost for each factor can be determined from information contained in the project schedule and resource plan. The cost for each factor should be totaled by fiscal year as well as the costs of all factors associated with a WBS element.

3.3.7.3 Contingency Cost

Identifying and quantifying project risk is critical to the development of a project budget. Good budgeting practices make allowances for handling risk. The Risk Management Plan described later in this section provides an area to estimate contingency cost for risk. Risk funding or contingency cost is forecast for each fiscal year and allocations made according to the needs identified in the risk management plan.

3.3.7.4 Spend Plan

The Project Spend Plan is a part of the Project Budget and allocates funding against the identified cost factors for a particular time period. Normally spend plans forecast the spending expected in each quarter using the WBS as the basis for the forecast. Monitoring the Spend Plan against actual spending provides a metric that readily identifies deviation of a project from its budget.

3.3.8 Performance Planning

The project performance plan defines how project success or failure is measured. Project success is achieved by meeting the stated business objectives for the project and by satisfying customer needs. The performance plan identifies the relationship of the agency's business objectives to performance goals and specifies: who will measure the performance; how and when performance is measured; and, how performance is reported. The performance plan also identifies and defines the project deliverables and acceptance criteria for each deliverable.

The performance plan is a result of the complete planning process that begins with the project scope and objectives defined by the project charter. All of the plans developed through execution of the core and facilitating processes provide information that is used in development of the performance plan.

3.3.9 Risk Management Planning

Risk management planning identifies how the project team responds to and manages risk throughout the execution and control phase of the project. Risk management is an ongoing process. Risk management planning identifies foreseeable risks, quantifies the threat posed by the risks, develops mitigation alternatives for the risks, and identifies responsible person(s) to manage or mitigate the risks. The risk management plan provides input to the budget and schedule plans.

3.3.9.1 Risk Management Plan Process

The risk management plan has four functional components, these components are:

- Risk Management Strategy
- Risk Identification and Quantification
- Risk Response and Monitoring
- Risk Mitigation Cost Estimation

The risk management strategy is the approach that will be taken to manage project risk. A risk management strategy describes the process for identification of risk, evaluation and prioritization of risk, identification of options for mitigating risk, the process for maintaining the risk plan and risk monitoring, and the responsibilities of individual project team members and other stakeholders relative to risk.

Risk identification and quantification require the project team to identify risks associated with execution of the project as well as external risks to the project. Risks are identified throughout detailed planning and project execution. Risks are frequently associated with resource and schedule constraints. One useful technique for expressing risk is to use an "if" and "then" statement. For example, "If" X thing happens "then" the result will be Y.

A risk is quantified by estimating the likelihood of occurrence of the risk event and, the effect the risk will have on the project. Probability of occurrence is the expression used to describe the likelihood of occurrence of the risk event. The probability of occurrence is expressed as a percentage. The higher the percentage, the more likely a particular risk event will occur. The impact of the risk event on the project is expressed as a numeric score of one (1) to five (5), with five identifying the highest level of impact.

Risk response and monitoring are driven by the results of identification and quantification. Risk priorities are assigned based on the level of impact and the probability of occurrence. Risks that are most likely to occur and have the highest level of impact are prioritized above less likely, lower impact risks. Prioritization of risks is used to focus the risk management effort and resources on those risk events that pose the greatest threat to the project.

Once identified, the Project Manager, Project Sponsor, (Risk Manager if appointed) and project team decide on the courses of action to be taken regarding at least each high priority risk.

- In some cases, the Project Manager may decide to take risk avoidance steps. Risk avoidance may add extra tasks, schedule and or costs to the project. The purpose of risk avoidance is to eliminate the likelihood that a risk event will occur.
- Risk mitigation actions are taken to reduce the likelihood that a risk event will occur and/or to reduce the impact of the event, should it occur. These actions may also add tasks, schedule and or costs to the project

- Risk acceptance is a risk strategy, in which the project takes no avoidance or mitigation steps in advance, but may respond to the event if/when it occurs or may choose to accept the consequences of that event.
- Risk response is the action taken and any consequent costs, schedule, scope or performance impacts from that response.

Each risk event is assigned to a project team member for continuous monitoring and evaluation. The person assigned to monitor a risk should be the individual most likely to direct the avoidance, mitigation and/or response activities if the risk event becomes a reality. Avoidance and mitigation actions for all risks should be documented. Response triggers that signal the project team that the risk event has or will soon occur, should also be identified and documented.

Risk avoidance, mitigation and response costs can be estimated, and funds planned for these activities. The process requires the estimation of cost by budget category. It is not necessary to set aside all funding estimated to respond to any identified risk. A contingency funding budget is based on the total cost identified to mitigate risk reduced by the probability that the risk event will not occur. This calculation requires the multiplication of the total mitigation cost by the probability of occurrence.

The risk plan will change frequently throughout the planning and execution phases of a project. Risk identification and monitoring must be continuous. Regular reviews of the risk plan and reevaluation of project risks should be included in the project schedule.

The assignment of a dedicated Risk Manager should be considered for all high risk projects.

3.3.9 Communications Planning

Communication is the exchange of information between parties. Communications planning involves identifying and meeting the information needs of the project stakeholders. Specifically, identifying which people need what information, when the information is needed, and how the information is collected and communicated. Communications planning strives to simplify and document effective communications within the project organization.

3.3.9.1 Communications Plan Development

The Communications Plan documents the information requirements of stakeholders and defines the procedures to meet those requirements. The plan details what, when, and how information is collected and reported. Information required in the communications plan includes:

- Identification of stakeholders with information needs
- Stakeholder information requirements
- Time frame or period the stakeholder needs the information
- Detailed description of the information need
- Description of when and how information is collected and who collects it
- Description of document distribution methods and frequency of distribution
- Definition of the handling procedures for temporary storage and final disposition of project documents

3.3.9.2 Standard Reports

All projects have unique reporting requirements and information needs. Standardization of report formats is an integral part of the communications plan. Standard report formats may be attached as part of the project plan.

3.3.9.3 Performance Reporting

Performance reports are typically required by all projects. These reports provide information on resource utilization by the project. (There are various types of performance reports.)

The most common type of performance report is the Project Status Report. Project Status Reports cover multiple areas, including scope, budget, schedule, risk, and quality. In order to produce status reports, the project team members must manage and monitor their project responsibilities closely.

3.3.10 Change and Configuration Management

The terms change management and configuration management are often used interchangeably. Some people view configuration management as part of change control, while others consider configuration management to be a rigorous change control system. This methodology defines configuration management as the management of the physical features, functionality, and documentation of hardware and software used by a project. The term change control will describe the management of change to the project baseline and includes project scope, cost, and schedule. Together, change and configuration management provide the means to control and manage change during the execution of the project plan.

Change and configuration management identify and manage change. Change and configuration management do not prevent change. Management of changes to the project or to the configuration of project deliverables includes: the administrative management (tracking, review, and assessment) of the proposed changes; the organized timely review and decision on recommended changes to controlled items; and the administrative process to ensure that the project team is informed of changes when they are approved.

3.3.10.1 Basic Change Management Control Concepts

Change control requires the following:

- All Project Plan items are baselined when the Project Plan is approved. Once the project plan items are baselined, changes to the baseline are managed through a formal change process.
- The integrity of the performance measurement baseline must be maintained. Only project scope changes can impact the performance measurement baseline.
- Changes are coordinated among all knowledge areas of the project. For example, a proposed schedule change may also impact the cost, risk, quality, and staffing of the project.

3.3.10.2 Baseline

The baseline process, while key to project control, is often misunderstood.

A baseline is defined as the original plan, for a project, a work package, or an activity, plus or minus approved changes. A modifier (e.g., schedule baseline, performance measurement baseline) is usually included to further define the baseline.

A baseline provides the “ruler” by which a project can be evaluated. If the schedule baseline plan indicates that an activity should be 30% complete at a specific point, and the activity is 15% or 90% complete, a schedule variance exists. Baseline changes are significant events and should not be made without consideration of their impact. Baseline changes are made to reflect a change in project scope, not because the project is behind schedule. A baseline change adjusts the ruler by which performance is measured. A variance does not justify a baseline change; it may indicate that the initial plan was not accurate or that there are issues with project execution.

3.3.10.3 Change and Configuration Management Planning Terminology

Within the project management industry, the use of change and configuration management terms is not standardized. For the purposes of this methodology, the following terms apply to change and configuration management:

- Control item is a project element that is considered a unit for the purpose of change and configuration management.
- Change control is the process of controlling, documenting, and storing the changes to control items. This includes proposing the change, evaluating it, approving or rejecting it, scheduling it and tracking it.

3.3.10.4 Change and Configuration Management Planning

During the Planning Phase, the project team identifies the control items for Change and Configuration Management, establishes the processes for both change management and for configuration management control, and documents procedures for:

- Naming and Marking Documents
- Submission and Retrieval of Control Items
- Version Control and Release Approval
- Storage, Handling and Disposition of Project Media

3.3.11 Quality Management and Independent Verification and Validation (IV&V) Planning

The objective of quality management planning is the successful delivery of products, goods, or services that meet organization needs and satisfy user expectations. Techniques for achieving quality management objectives are product testing, phase exit reviews, status reports, project audits, and independent verification and validation (IV&V).

The Quality Management and IV&V Plan defines how the project management team will implement the organization’s quality policy. If the organization does not have a formal quality policy then the project management team should develop a quality policy for the project. The quality plan documents the processes, procedures, activities, and tasks necessary to implement the quality policy. The plan also assigns responsibilities and allocates resources for completion of the activities and tasks. The project performance plan is linked to the quality management plan. The performance plan documents project goals and project deliverables as well as the acceptance criteria for the project deliverables.

Product testing, project auditing, and IV&V will focus on evaluation of the deliverables, project processes, and achievement of project performance goals. The IV&V effort will provide a thorough and independent review of the project processes and specified deliverables. In addition to the performance plan, the quality plan must be synchronized with the resource, schedule, budget, and risk management, plans.

3.3.12 Detailed Planning Transition Checklist

The project transition checklist provides a vehicle to verify completion of a project phase before beginning the next phase. The Detailed Planning Transition Checklist is a tool to verify that necessary steps have been completed and establishes the exit criteria from the planning phase. The transition checklist focuses on completion of project plans and plan approval. It is important to make sure that all the necessary plans and supporting documents pertinent to the project are completed and approved by management as specified in the Project Charter.

Detailed Planning Transition Checklist is formatted as a list of actions that should be accomplished before completing the planning phase. Some actions must be completed and represent the exit criteria for the particular phase addressed. Other items in the list may not necessarily apply to every project-planning scenario.

Section 4. Project Execution and Control Phase

The Project Execution and Control Phase is the part of the project and product lifecycle where the tasks that build the deliverables are executed. The Project Execution and Control Phase begins when the project plan is approved and the resources necessary for executing the starting task are assembled. Project execution should be in accordance with the approved project plan. Figure 4.1 depicts the components of Commonwealth Project Management, as discussed in Section 1.

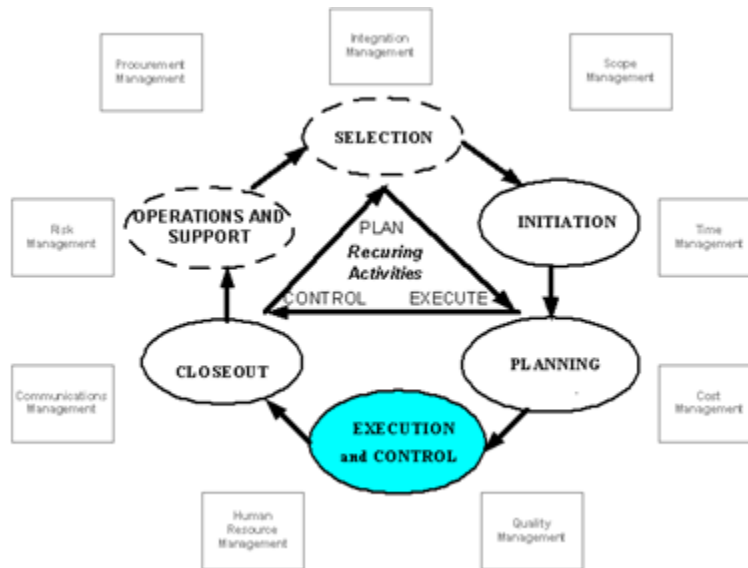


Figure 4. Project Management Knowledge Areas, Lifecycle, and Recurring Activities

4.1 Activities and Documents in the Execution and Control Phase

Project execution and control consists of task execution, measuring project progress, reporting project status, and exercising management controls. The project team executes the tasks as mapped out in the project plan. Controlling project execution requires the measurement of project performance, monitoring project risk, and controlling change to the project baseline. The project manager is focused on observing and analyzing the work underway. Controls outlined in the project plan keep the project on schedule, in scope, and within budget. During this phase, the processes of executing, controlling, and planning are continuous interactive activities. Figure 4.2 depicts these activities. This phase ends when the product, good, or service developed has met the user acceptance criteria established in the performance plan and a user acceptance document has been completed. From the project management perspective, the essential deliverables created in this phase are project status reports, change control requests (if needed) and user acceptance documents for each asset to be delivered by the project.

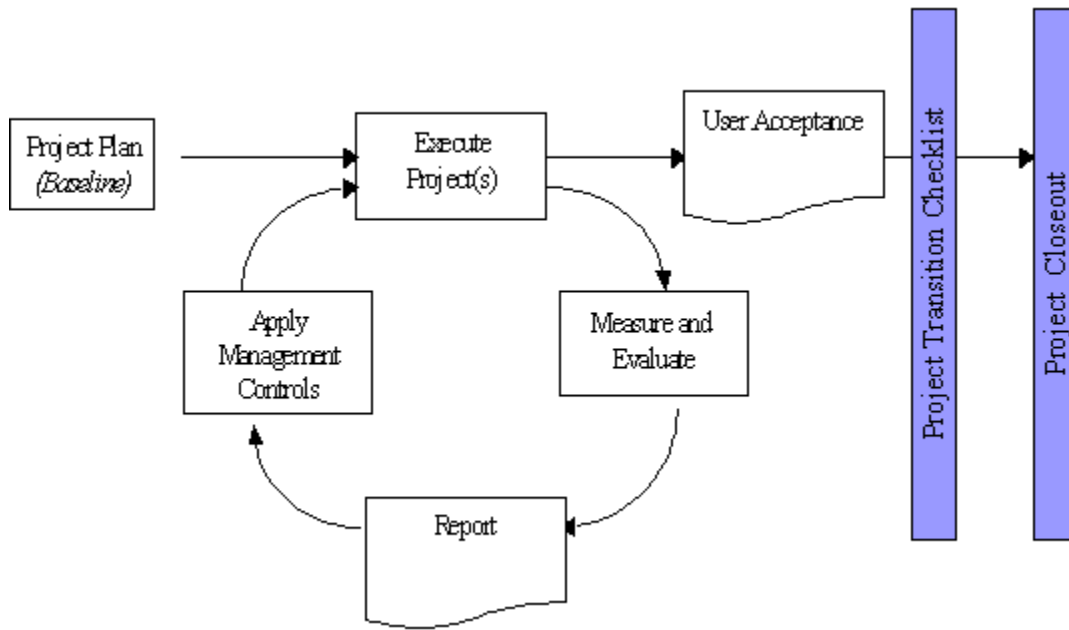


Figure 4.1: Project Execution and Control Phase Processes

4.2 Executing the Project

Execution is the act of carrying out planned activities. The execution of the project plan is simply the act of performing task and activities that result in the production of the project deliverables. Task and activities performed must be completed effectively and efficiently. The project plan serves as a road map and a common frame of reference for all members of the project team. The project plan is therefore, the foundation for successful delivery of projects. In a perfect world, plans are executed precisely as written. In reality, no plan is ever performed with such precision. Plans are forward looking documents that cannot anticipate all eventualities.

During execution, the project team must continuously monitor its performance in relation to the baselined project plan. By measuring and evaluating the actual execution of project activities against the baseline plan, the project team and stakeholders can gauge the progress of the project.

4.2.1 Start Up

A project kick off meeting can facilitate the transition from planning activities and tasks to executing them. A kick off meeting enhances execution by focusing the team on the project and by defining a starting point for beginning project execution.

The kick-off meeting provides an opportunity for communication and establishing the commitment of executive management, team members and stakeholders to the success of the project. The focus of the meeting is communications, identification of team members and stakeholders, reviewing the project scope and business objectives, identifying the challenges, and identifying the next step in getting the project underway. At this point, team members and team leads must, at a minimum, have copies of the schedule. The schedule must identify to each person his specific tasks and dates for starting and completing them.

4.2.2 Project Performance Monitoring

Performance monitoring can provide assurance that the project is progressing as planned or reveal the need to intervene and take action to ensure the achievement of the desired business objectives. The execution of project task and activities occur in a cycle where the task is executed, execution is measured, the results are reported, and management controls needed are applied. (See Figure 4.3.) Performance monitoring involves the collecting, analyzing, and reporting project performance information to provide the project team and stakeholders with information on the status of project execution. Measurements, or metrics, are used to monitor project progress and are based on information or data collected about the status of project activities or tasks.

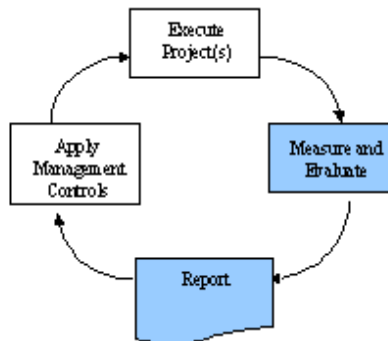


Figure 4.2.2: Project Monitoring Cycle

4.2.3 Common Project Metrics

Various metrics can be gathered to monitor project progress. Common areas to monitor typically include project schedule, work effort, costs, issues resolution, and changes to the project. Other metrics may be requested and defined by project or organizational management. Some common metrics, which may be utilized during project execution, are provided below.

4.2.3.1 Project Schedule Deviation

Project schedules may include all tasks and estimated work hours for the entire project or it may represent a “phased” or “iterative” approach to the project. In the latter case, the schedule will reflect the tasks and efforts of only a portion of the entire project. Reporting for the purposes of management should be against the detailed portion of the project schedule. Monitoring the critical path is essential. By definition, the critical path of a project has little or no slack time. All schedule changes must therefore be analyzed for impact to the project’s critical path since such changes will result in deviation from the project schedule.

Monitoring of the planned versus actual starts and completions provides a gap analysis and leads to identification of overall trends. Status of tasks is reported as:

- Not Started - 0 %
- Started/In Process - 1-99 %
- Completed - 100%

Metrics To Capture – For the reporting period and for plan to date:

- Number of "Planned Starts"
- Number of "Planned Completed"
- Number of "Actual Starts"
- Number of "Actual Completed"
- Number of tasks reporting > 84% completed
- Total number of project tasks
- Number and Percent of Milestones Tasks outstanding
- (Total number of project milestones – Completed = Total Outstanding)
- (Total outstanding / Total number of tasks = % Outstanding)
- Work Effort

Monitoring work effort is essential for evaluating whether the project is executing within budget or not. This information is used to project the cost of labor for the project. The number of hours, preferably at the task level, needs to be captured and tracked.

Metrics To Capture – For the reporting period and for planned to date:

- Number of "Planned Hours"
- Number of "Actual Hours"

Metric Calculations – For the reporting period and for planned to date:

- Deviation from plan (Planned – Actual = Deviation from Planned Hours)
- Percent Deviation from plan (Deviation from Plan/Planned Hours x 100 = % of Effort Deviation)

4.2.3.2 Project Cost Deviation

The budget plan developed during planning represents the basis for measurement of deviation during execution. Measuring cost requires the support of the financial and procurement support business units.

Metrics To Capture – Costs for the reporting period and for planned to date for:

- Internal Staff Labor
- Services
- Development Tools
- Software
- Hardware
- Materials and Supplies
- Facilities
- Telecommunications
- Training
- Contingency (Risk)

Metric Calculations – For the reporting period and for planned to date:

- Difference between actual expenditures and planned budget for each metric
- Increase or decrease to total project budget cost
- Percentage deviation from spending plan for the period measured
- (Spending Plan – Actual Cost)/Actual Cost x 100 = % Deviation from Spending Plan

4.2.3.3 Project Issues

One indicator of project health is the number of open issues and their impact on the project. Proactive issue management aims to track and analyze all issues, specifically focusing on those that have remained unresolved.

Metrics To Capture – For the reporting period and for planned to date:

- Number of new issues
- Number of closed issues
- Number of outstanding issues

Metric Calculations – For the reporting period and for planned to date:

- Total Number of issues = Number of outstanding issues + Number of closed issues
- Percentage of issues closed = issues closed divided by total issues

4.2.3.4 Project Change Requests

There will always be changes to a project. The challenge is to identify and manage them. The Change and Configuration Management Plan provide a process and guidance for managing change during project execution. A change management log and change request documents are used as tools to monitor, track, and approve request to change items under change control or configuration management.

Metrics To Capture – For the reporting period and for plan to date:

- Number of new requests by impact type, by requestor type
- Number of closed requests by impact type
- Number of outstanding requests by impact type
- Number of accepted change requests by impact type
- Number of rejected change requests by impact type
- Number of undecided change requests by impact type

Metric Calculations – For the reporting period and for plan to date:

- Total Number of requests by impact type = Number of accepted requests by impact type + Number of rejected by impact type + Number of undecided requests by impact type – Number of new requests by impact type
- Percent of high impact change requests = Number of high impact requests / Total number of requests

4.2.4 Project Status Reporting

A standard requirement of all projects is to provide information to both executive management and the project team members on the status of the project. Although the frequency of the reports may sometimes vary, the frequency should correspond with information requirements identified in the project Communications Plan. Often status reports are prepared for executive or team meetings.

The project status report is a means of communicating regularly the ongoing progress and status of a project. The overall project status is communicated to all team members using

the project status report. The same report may be used to communicate the project status to managers and other stakeholders. Key project team members generally produce the project team's status reports on a weekly, or biweekly, basis.

The information shared in the Status Report should be in a consistent format throughout the project. The types of reports a particular project uses may vary in detail and metrics required but the basic format remains consistent across all projects. Project Control

Control of the project is exercised through formal and informal processes exercised by the project manager, project team, and stakeholders. The process of conducting reviews and monitoring reports exerts a degree of control over the project. This discussion will, however, focus on the formal processes of control established by the project plan.

4.2.5 Project Plan

The centerpiece of project control documentation is the project plan. The project plan fixes the project schedule, tasks, and resources. The plan also establishes the procedures to manage quality, risk, communications, and change. Use of the plan to guide execution of project task exerts a great degree of control in the process of developing the deliverables. As mentioned previously, change is inevitable. Issues and unforeseen risk events must be addressed and resulting changes must be managed. Control over unplanned events is exerted through issue management and formal change management processes.

4.2.6 Issues Management Process

The purpose of the issue management process is to provide a mechanism for organizing, maintaining, and tracking the resolution of issues that cannot be resolved at the individual level. The approach consists of issue control mechanisms and a defined process that enables the project team to identify, address, and prioritize problems and issues.

The Issue Management Log is used to track, document, and resolve issues that are identified during project execution. Initially, issues may be identified in a project status report or in a project team meeting. The Issue Log is a master record of issues that are identified and is used to track progress toward resolution. The Issue Management Log is a means of reporting issues and is used by the project team to document the issue, assess the impact of the issue, make recommendations, and identify the resources needed to resolve the issues. Managers use the Issue Management Log to assign responsibility and to document decisions on actions directed to resolve the issue.

Issue management requires a process that begins with individuals submitting information on the issues to be considered. Any project team member, customer, stakeholder, or contractor can submit an issue.

4.2.6.1 Reporting the Issue

Issue management is divided into three phases. The first phase occurs when a person identifying an issue reports the issue. The Issue Management Log (linked in CTP) provides a format to identify the issue, document the date the issue is submitted, and identify the person reporting the issue. It also requires the submitter to provide:

- Date resolution is required
- A proposed assignee to resolve the issue

- An issue description
- An impact statement

The identifier of the issue should attach any supporting documentation that will clarify the issue, such as reports, correspondence, test results, error messages, or other pertinent data.

The project manager records the issue in the Issue Management Log and assigns a control number. The project manager must then assign someone to investigate the issue and develop a recommendation for resolving the issue. The issue resolution task is an action item reported in the project status reports. The project manager completes:

- Assignment of the action item to a responsible person
- Planned completion date

4.2.6.2 Determining the Resolution

The second phase of issue management is determining a resolution for the issue. The Issue Management Log provides a format for identifying alternatives for resolving the issue and making recommendations on what actions should be taken. The person assigned to investigate alternatives and make a recommendation completes the following information:

- Discussion of alternatives
- Recommendation
- Estimate of additional resources

4.2.6.3 Deciding on Recommendation

The third and final phase is the management decision. Management reviews the recommendation provided and decides to accept the recommendation made, modify the recommendation, reject the recommendations, defer a decision, or request additional information. Management decisions can lead to change or configuration management actions, which are then handled through the change and configuration management process. When the issue or problem has been resolved and verified, the actual date the problem was resolved and the issue is closed in the Issue Management Log.

4.2.7 Change and Configuration Management

Any change to the configuration of a deliverable or to the baseline elements of the project plan must be managed with deliberate precision. The Change and Configuration Management Plan establishes the processes used to manage and control change. Additionally, the specific items that will be controlled through the change and configuration management process are listed in the Change and Configuration Management Plan. Activities involved in change and configuration management include controlling changes to the scope and the schedule.

4.2.7.1 Scope Change Control

Uncontrolled expansion of the project scope often results in project failure. A scope change usually requires additional project funds, resources, and time. The approved Project Charter and baselined Project Plan establish the scope of the project. A change in the project scope should be approved through the Change Control Request process by either the

Internal Agency Oversight Committee or the CIO. Often, small incremental change requests result in an unacceptable and unauthorized expansion of project scope. The project manager and team must monitor changes to the scope baseline and recognize when a formal scope change should be made. Formal change management procedures require the documentation and authentication (with the signatures of the approving authority) for any change made to the project scope.

4.2.7.2 Schedule Control

Schedule issues come from a variety of sources. Variation from the project schedule must be investigated and the cause determined as soon as possible. When the reason for a schedule problem is discovered, a plan must be developed to correct the problem, as quickly as possible, with the least impact to the project. Schedule control is typically managed at the project level by the project manager. However, if the project's critical path is impacted, or scheduled milestones in the charter and project plan change, formal change management procedures must be implemented. The amount of variance that can be tolerated in the project schedule adjustment, if any, is addressed in the project charter.

4.2.7.3 Cost Control

Projects fail to control cost, or go over budget, for many reasons. Failure to control cost is often a result of incremental changes, unplanned risk mitigation, or inaccurate budget planning. Out-of-control costs are frequently an indicator of other problems, including scope creep or poor performance on the part of the development team. Cost control is concerned with the following:

Influencing the factors that create changes to the Project Budget Estimate to ensure that the changes are beneficial

- Determining that the project budget estimates have changed
- Managing the actual changes when and as they occur

Cost control includes the following:

- Monitoring expenditures to detect variances from the project spend plan
- Executing the change control plan to prevent incorrect, inappropriate, or unauthorized changes from being made to the Project Budget
- Recording authorized changes accurately in the Project Budget Plan

4.2.8 User Acceptance

Acceptance criteria for project deliverables establishes in advance an agreed upon standard of performance or capability that the user will accept in a specific deliverable. The Performance Plan developed in the Project Planning Phase articulates the project deliverables and acceptance criteria. Acceptance criteria then become the fundamental guideline for the design team to build a solution that the user will find acceptable.

The execution phase ends when the user has agreed to accept the deliverable(s) in the state that they exist. The acceptance criterion is the standard that the user uses to judge if each deliverable is satisfactory. In some cases, the deliverable may not meet all acceptance criteria but, from an overall view, the deliverable will meet the requirements of the user. The user must authenticate acceptance of each deliverable. The user will also identify any

issues that remain outstanding and the agreed to plan for resolution of any outstanding issues.

4.2.9 Project Transition Checklist

The project transition checklist provides a vehicle to verify completion of a project phase before beginning the next phase. The transition checklist used at the end of the Execution and Control phase focuses on completion of project tasks, and verification that acceptance criteria have been met. Additionally, the transition checklist forces the project team and project stakeholders to formally address the transfer and acceptance of the deliverables and associated documentation.

4.2.10 Project Execution and Control Transition Checklist

Project Execution and Control Transition Checklist is a list of questions that indicates necessary actions have been accomplished prior to moving to the Project Closeout phase. The checklist provides a status column where the completion status of project elements is recorded.

Section 5. Project Closeout Phase

The Project Closeout Phase is the last phase in the project lifecycle. Closeout begins when the user accepts the project deliverables and the project oversight authority concludes that the project has met the goals established. The major focus of project closeout is administrative closure and logistics. Project closeout includes the following key elements:

- Turnover of project deliverables to operations
- Redistributing resources—staff, facilities, equipment, and automated systems
- Closing out financial accounts, including Contract Administration
- Completing, collecting, and archiving project records
- Documenting the successes of the project
- Documenting lessons learned
- Planning for Post Implementation Review

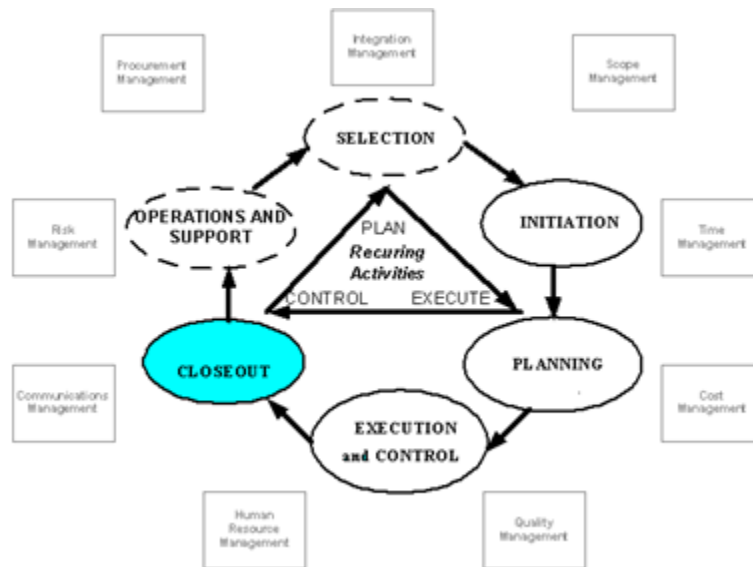


Figure 5: Project Management Knowledge Areas, Lifecycle, and Recurring Activities

5.1 Activities and Documents in the Closeout Phase

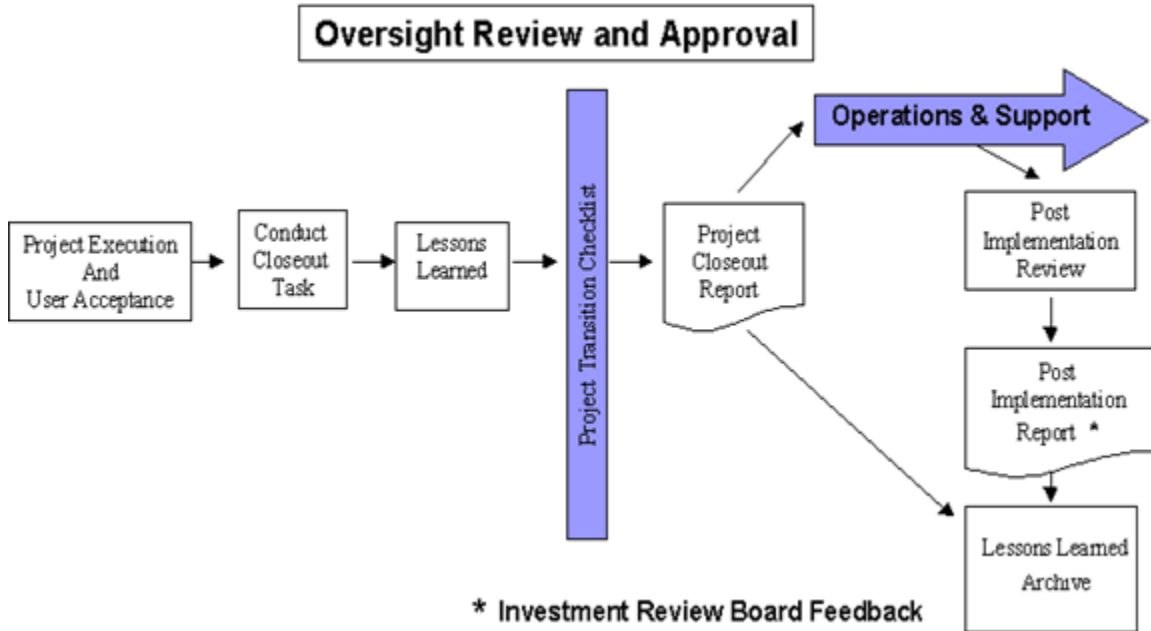


Figure 5.1: Project Closeout Phase Processes

The major activities in the Closeout Phase consist of tasks that are typically administrative and logistical in nature. Initially, the focus is on performing the tasks associated with dispensing and reconciling personnel, property, and funding. When these tasks are finished, the attention of the project manager is focused on documentation of lessons learned and project closure. At some predetermined point, a Post Implementation Review of the project deliverables is conducted. The primary documents prepared during this phase include the Project Transition Checklist, Project Closeout Report, and Post Implementation Report.

5.2 Turnover to Operations

The most important aspect of project closeout is the physical turnover of control of the product, good, or service delivered by the project. All project deliverables will need to be maintained and supported after the project team disbands. An operational unit of the organization (for which the deliverable is developed) assumes responsibility for the support of the deliverable. Procedures for this turnover and acceptance by the operational unit must be determined. Turnover and acceptance activities include but are not limited to knowledge transfer, documentation transfer, and physical transfer of the deliverable. A formal acknowledgement of receipt (acceptance) of the project deliverable is executed by the operations and project managers.

5.3 Administrative Closure

Administrative closure involves the preparation of administrative documentation, collection of project documentation, disposition of project documents, and logistics activities that ensure that the project resources are redistributed. Administrative closure includes, but is

not limited to, task such as archiving, financial account closure, facilities turnover (or closure), contract closure, and personnel reassignment.

5.3.1 Collecting Project Archive Data

Historic project data is an important source of information. The purpose of collecting project archive data is to provide historical information on agency projects to capture information on lessons learned, project successes, project funding, etc. to help improve future projects. Typically, the following project data is archived:

- Project notebook
- Project concept document
- Project Charter
- Project Plan
- Project management and oversight review records
- Correspondence
- Meeting notes
- Status reports
- Contract file
- Technical documents, files, program, tools, etc.,

All records should be stored following Commonwealth of Virginia record retention guidelines. Summary technical information should be electronically stored for historical reference to facilitate later review. The project archive should include a description of the files being submitted, the application (including version) used to create the archived materials, and a point of contact.

5.3.2 Personnel

If personnel have been committed to the project full-time, it is important to get the people back into the available resource pool as quickly as possible. This will ensure that the staff stays busy and that other projects within the organization do not fall short of resources. In some cases, employee performance reports or other documentation must be prepared for personnel assigned to the project manager. In matrix organizations, the project manager should communicate to the functional manager information about the performance of the employee. The project manager should also make recommendations for recognition of performance as the case may warrant. Before any employee is officially transferred, the project manager or his representative must ensure that all project materials and property are turned over by the employee. The project manager must also ensure that each employee's project hours have been accounted for and charged to the project.

5.3.3 Facilities

If the project team has occupied agency facilities for a long period of time during the project, it is a good idea to let the controlling facilities personnel know that the space used for the project will become available again. Be sure to check facilities guidance documentation to determine whether changes made to the project team area (structure, equipment, or technical modifications) are the responsibility of the project team after the project is complete. Returning the facility and equipment to its original state could add unanticipated cost and manpower to a project.

5.3.4 Financial Account Closure

Financial closure is the process of completing and terminating the financial and budgetary aspects of the project. Financial closure includes both (external) contract closure and (internal) project account closure. All expenditures must be accounted for and reconciled with the project account. When financial closure is completed, all expenditures made during the project have been paid as agreed to in purchase orders, contracts, or inter-agency agreements.

5.3.5 Contract Closure

Contract closure is the process of terminating contracts with external organizations or businesses. These contracts may be vehicles for providing technical support, consulting, or any number of services supplied during the project that the agency decided not to perform with internal resources. Contracts can be brought to closure for a variety of reasons, including contract completion, early termination, or failure to perform. Contract closure is a typical but important part of project management. It is a simple process, but close attention should be paid so that no room is left for liability of the agency.

In order to close a contract it is important to collect all of the pertinent documentation for review. This will include all of the original contracts and supporting documentation such as schedules, contract changes, and performance reports. This documentation needs to be reviewed thoroughly to ensure there are no unrealized contract issues that could result in legal liability. A thorough review of the procurement and contracting documents must include contract milestones, services provided or deliverables and documentation delivered.

To formally close a contract, the agency provides the contracted company or organization with a formal written notice stating the completion of the contract and reason for termination. Standard verbiage for acceptance and closure is usually found in the original contract itself.

In some cases, the contract may include provisions for on-going operational support. Under these circumstances, a contract may not be closed, but responsibility for its continued management or oversight may need to be handed-off to another entity within the agency, e.g., the supply chain management organization or an operational entity. Copies of contractual documents may be retained in the project files, while the original documents are forwarded to the gaining organization.

It is also a good idea to keep a complete set of contractual records for the project in a safe and accessible place in case they need to be referenced at any point in the future.

5.4 Lessons Learned

Lessons learned are the documentation of the experience gained during a project. These lessons come from working with or solving real-world problems. Lessons learned document identified problems and how to solve them. Lessons learned are gathered throughout the lifecycle of the project to help eliminate the occurrence of the same problems in future projects. The CTP system provides a link to the VITA PMD Lessons Learned database for all of the projects in the Commonwealth IT Portfolio.

Lessons learned typically provide: a brief discussion of the problem to identify its nature, source, and impact; site any references that provide additional detail (references may

include project reports, plans, issue logs, change management documents); and general literature or guidance used from another source; and, recording the corrective actions taken and results.

5.4.1 Lessons Learned Sessions

In addition to communicating the closure of a project in writing, it is also advisable to have a mechanism for group review. Lessons learned sessions are valuable closure and release mechanisms for team members, regardless of the project's success. The lessons learned session is typically a meeting or a series of meetings that may include the following:

- Project team
- Stakeholder representation—including external project oversight
- Executive management
- Maintenance and operation staff

For a lessons learned session to be successful the problems encountered by the project team must be openly presented. It is important, however, that the problem discussions do not merely point a finger at some target other than the project team; responsibility and ownership for problem areas are critical to developing useful recommendations for future processes.

Problems that were encountered should be prioritized with focus on the top five to ten problems. It is not necessary to document every small thing that happened. However, all legitimate problems and issues should be discussed as requested by customers or management.

5.4.2 Lessons Learned Format

There are numerous formats for documenting lessons learned. Typically, each lesson learned is documented on a single page. The document should contain in its heading the name of the project, date, and point of contact for the lesson learned. The body should describe the lesson learned in the following paragraphs:

- Statement of the Problem – Describe the problem that occurred. Provide sufficient detail to establish what happened.
- Discussion – Describe in detail the cause and impact of the problem.
- References – Provide any references used or other sources of information that may be helpful in understanding the problem or corrective actions.
- Corrective Actions – Identify what corrective actions were taken and discuss the results. If a corrective action was not taken, but became apparent later, identify this action as well.

5.5 Project Closeout Transition Checklist

The Project Transition Checklist provides a vehicle to verify completion of a project phase before beginning the next phase. The transition checklist used at the closeout phase focuses on completion of project tasks and satisfying acceptance criteria. Additionally, the transition checklist forces the project team and using organization to address the issue transfer for both the deliverable and associated documentation.

Project Closeout Transition Checklist is a list of questions that indicates necessary actions have been accomplished before completing the Project Closeout Report. The checklist provides a status column where the completion status of project elements is recorded.

5.6 Project Closeout Report

A Project Closeout Report documents the completion of closeout tasks and project performance. The report provides a historical summary of the projects deliverables and baseline activities over the course of the project. Additionally, the project closeout report documents the user acceptance, identifies variances from the baseline plan, lessons learned, and disposition of project resources. The project closeout report is intended to provide a concise evaluation of the project.

The project manager typically has responsibility for preparing the report. The project manager gets input from the entire project team, the customers, and other major stakeholders. People performing different functions on the project will have different outlooks on the successes and failures of the project and on possible solutions. The Project Closeout Transition Checklist is used to guide the development of the report. Lessons learned sessions are also used.

Establishing the date for a future post implementation review of the deliverable is the final element of the closeout report. This date must be coordinate and agreed to by the organization and project manager. Typically, the project manager or project sponsor will conduct a project implementation review after the deliverable has been in service for a period of time adequate for evaluation of the product or service's successful integration into the business. Typically, a six-month period is adequate.

5.7 Post Implementation Review and Report

A Post Implementation Review and Report documents the successes and failures of the project deliverable. The review process should be directed by the project sponsor or manager and is typically conducted six to twelve months after Project Closeout. The review is a collection of data from the organization and users about the deliverable. The data will be used in a report that is focused on how well the deliverable performed, how well users accepted the deliverable, and what is the actual cost to operate and maintain the deliverable. Fundamentally, the report addresses whether or not the projected return on investment was achieved.

The report will specifically address:

- How well the deliverable solved the Business Problem identified in the Project Charter
- Impact the deliverable had on the Agency Core Business Activities
- Project Performance Measures
- Actual operational cost versus projected operational cost
- User acceptance or satisfaction with the delivered product
- Organizational change required or resulting from the deliverable
- Actual Return on Investment for the period versus projected return on investment

5.7.1 Post Implementation Report Format

- Cover Page

- Title
- Organization or Agency
- Date
- Authors Name
 - Address
 - Phone Number
 - Email Address
- Report Body
 - Executive Summary
 - Table of Contents
 - Introduction
 - Background
 - Post Implementation Review process or methodology used
 - Project Proposal
 - Project Charter
 - Findings
 - Recommendations

Appendix A: Project Management Organizations

International Project Management Association

International Project Management Association is the recognized international nonprofit network organization for qualified project management. International Project Management Association's vision is to be the prime promoter of project management as a powerful tool for managing change.

International Project Management Association started in 1965 as a discussion group of managers of international projects. The first international congress was held in 1967 in Vienna with participants from 30 different countries. Since that time International Project Management Association has developed steadily and is now the prime international promoter of project management in Europe, Asia, and Arab countries. A most significant characteristic of International Project Management Association is the parallel development of 18 associated national societies that serve the specific development needs of each country in its own language. International Project Management Association has thus emerged as the representative body of an international network of national project management societies.

www.ipma.ch

Project Management Institute (PMI)

The Project Management Institute is a nonprofit standards organization located in, and serving primarily, the United States. Project Management Institute publishes the project management standards internationally known as the Project Management Body of Knowledge (PMBOK).

www.pmi.org

Association for Project Management (APM) (UK)

The Association of Project Managers exists to help its members and to advance and promote the profession of project management, its skills, and its practice. It is the only UK-based organization dedicated to advancing the science of project management and the professional development of project managers and project management specialists. The association is committed to an energetic program of activities to help project managers and others involved in project management develop their professional careers. It is affiliated with the International Project Management Association based in Zurich, Switzerland.

www.apm.org.uk/

Software Engineering Institute

The Software Engineering Institute (SEI) is a federally funded research and development center sponsored by the U.S. Department of Defense through the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics [OUSD (AT&L)].

The SEI mission is to provide the technical leadership to advance the practice of software engineering so the Department of Defense can acquire and sustain its software-intensive systems with predictable and improved cost, schedule, and quality.

The SEI mission includes four objectives:

1. Accelerate the introduction and widespread use of high-payoff software engineering practices and technology by identifying, evaluating, and maturing promising or underused technology and practices.
2. Maintain a long-term competency in software engineering and technology transition.
3. Enable industry and government organizations to make measured improvements in their software engineering practices by working with them directly.
4. Foster the adoption and sustained use of standards of excellence for software engineering practice.

www.sei.cmu.edu/

General Accounting Office

The General Accounting Office is the audit, evaluation, and investigative arm of Congress. GAO exists to support the Congress in meeting its Constitutional responsibilities and to help improve the performance and ensure the accountability of the federal government for the American people. GAO examines the use of public funds, evaluates federal programs and activities, and provides analyses, options, recommendations, and other assistance to help the Congress make effective oversight, policy, and funding decisions. In this context, GAO works to continuously improve the economy, efficiency, and effectiveness of the federal government through financial audits, program reviews and evaluations, analyses, legal opinions, investigations, and other services.

www.gao.gov/

National Aeronautics and Space Administration

The National Aeronautics and Space Act of 1958 ("Space Act") established NASA and laid the foundation for its mission. It directs NASA to conduct space activities devoted to peaceful purposes for the benefit of all humankind. Additionally NASA is to preserve the leadership of the United States in aeronautics and space science and technology, and expand knowledge of the Earth and space. NASA is to conduct human activities in space and encourage the fullest commercial use of space. NASA is composed of a diverse group of men and women at NASA Headquarters and the Agency's 10 field installations around the country. NASA, however, does not accomplish its mission alone, but in partnership with large and small contractors, members of the academic community, other Federal, State, and local agencies, and other space agencies from nations around the globe. Together, these entities form a comprehensive, highly skilled team that is dedicated to providing high-quality, technologically superior products and services to its customers. NASA's highly skilled workforce, including scientists, engineers, technicians, and administrative and support professionals, and its world-class facilities represent the backbone of the Nation's civil research and development capabilities in aeronautics and space.

www.nasa.gov

Michigan Department of Information Technology, Office of Project Management

The Office of Project Management (OPM) was established to assist the State of Michigan government agencies to manage and monitor their Information Technology Projects. OPM's objective is to ensure repeatable and predictable success of these projects. A successful project will minimally satisfy the following three categories:

1. Projects will be completed within the timeframe allocated
2. Projects will be completed within the budget allocated
3. Projects will be completed with the anticipated quality

Office of Project Management is working to institutionalize formal project management practices into all areas of state government. These efforts include:

- Promote the use of the state's Project Management Methodology
- Broaden Project Management Training Opportunities
- Implement enterprise Project Management Tools
- Build a Project Management Center of Excellence
- Develop Project Management Career Paths
- Development of Project-Based Quality Management

Implementation of these initiatives will produce a project management infrastructure that will allow agencies to effectively manage and monitor their projects. The Office of Project Management is reviewing industry best practices and is working closely with major organizations in this industry. The Project Management Institute (PMI), the world's leading project management professional association is one example. PMI's Project Management Body of Knowledge (PMBOK) is an encyclopedia of proven, traditional as well as innovative and advanced practices of project management.

www.michigan.gov/dmb/

Minnesota Office of Technology, Enterprise Project Management Office

The Enterprise Project Management Office (PMO) was established to assist Minnesota state agencies to manage and monitor their Information Technology (IT) Projects. It is constantly reviewing industries best practices and is working closely with major organizations in this industry, both in the private and public sector. The Project Management Institute (PMI®), the world's leading project management professional association, is one key example. PMI's A Guide to the Project Management Body of Knowledge (PMBOK®) is an encyclopedia of practices of project management has been the basis for the development of the State of Minnesota's Project Management Office methodology

www.state.mn.us/portal/mn/jsp/content.do?agency=OETweb&id=-536890276&subchannel=-536890651

New York State Office of Technology, Project Management Office

In January 2001, a statewide Project Management Office (PMO) within the NYS Office for Technology was created. The PMO was charged with the following mission: to increase project management competence and foster sustained success of projects carried out by New York State. The top priority of the PMO was the development of a common Project Management methodology for use by Project Managers across the state. In September 2001 the PMO published Release 1 of the NYS Project Management Guidebook. The Guidebook was mailed to all State agencies and is also available via the web.

The OFT PMO, working with representatives from State agencies, has developed the following core services:

- Project Management Methodology

- Project Management Consulting Services
- Project Management Outreach

All services and products have been developed with input from numerous agency representatives who have shared their ideas, requests, and best practices.

www.cio.ny.gov

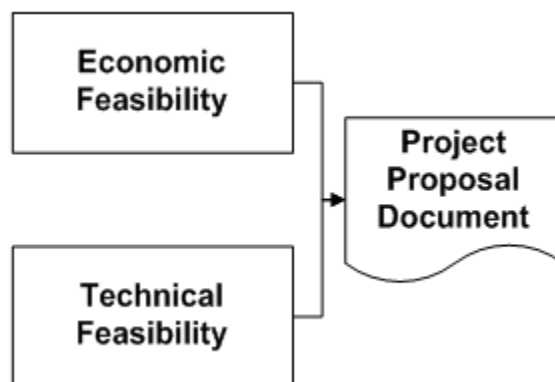
Appendix B: Cost/Benefit Analysis Reference Material

This Commonwealth Project Management Guideline Appendix is for general familiarization only. Refer to the Project Management Standard and Commonwealth Technology Portfolio (which is the official source of record for Commonwealth IT Projects) for specific requirements, procedures and forms regarding Cost/Benefit Analysis. Whereas the Project Management Standard and CTP are routinely updated to meet current governance and oversight documentation and procedural changes, the templates and instructions presented below are the original forms which were used at the inception of the Commonwealth's enterprise-wide Project Management Office. They may be useful for gaining a general understanding of documentation requirements, but should not be used for documentation purposes in current Commonwealth IT Projects.

B.1: Cost/Benefit Analysis Overview

Decision makers must make the most of scarce resources and at the same time respond to ever-increasing demands for improved performance and new technology. The importance of investment management in information technology continues to increase. The failure rate of many IT investments raises legitimate concerns about the value of those investments. As a result, IT investment proposals often require a rigorous business case to justify new IT investments. The business case, and associated feasibility studies, will include methods of assessing the costs and returns expected from the investment. These methods include the Cost/benefit Analysis (CBA), which is the primary subject of this appendix to the Project Management Guideline.

Generally, feasibility studies help to determine if potential solutions are viable and provide a basis of comparison and selection between alternatives. Technical feasibility studies focus on the technology of the solution and are used to determine a preferred IT solution from a technology perspective. An economic feasibility study, such as a Cost/ Benefit Analysis (CBA), determines if a solution is economically sound and cost effective. Based upon these analyses, a technology solution is proposed in the next step of the initiation process, and the results of the technical and economic feasibility studies are used to justify the proposed technology solution.



Cost/Benefit Analysis is a systematic approach to estimating the strengths and weaknesses of technology alternatives that satisfy agency business requirements. This guideline will help individuals prepare cost/benefit comparisons with recommendations on how to gather information, present costs, determine benefits, identify risks, and draw economically sound

conclusions. Cost/Benefit Analysis is an analytical approach for choosing the alternative best suited to meeting an agency's business requirements.

The appendix incorporates the following features:

- COV Cost Estimating Rules - Template formats allow agencies to associate cost and benefit categories to potential budget items by using expenditure structures published by the Virginia Department of Planning and Budget.
- Best Practices - This guideline follows established financial practices for economic analysis.
- Generic in Nature - It can be applied to all technology acquisitions considered appropriate by the agency.
- Examples - A problem or description used to illustrate a principle or method.
- Spreadsheet Modeling - The methodology is oriented toward automated spreadsheet technology to simplify the analysis.
- Questionnaires - Forms containing a set of questions used to gather information.

Successful IT Investment decision-making and management begins with the identification of benefits and costs. These two factors are essential items regardless of the nature of the investment, metrics applied, or approach used to value them.

Investments in the public sector are generally undertaken for one, or a combination, of four general purposes:

- Expansion or improvement in service or function of agency.
- Reduction of operating costs/increasing revenues.
- Research and development.
- Mandate

Benefits should clearly answer the question, "What does this investment provide the customer, public or agency?" Whether expressed in qualitative or quantitative terms, benefits should relate directly to the fulfillment of specific, expressed needs.

B.2: Cost/Benefit Analysis Process

The Cost/Benefit Analysis process can be broken down into seven sequential steps depicted below. Each step is described in detail in the following pages.

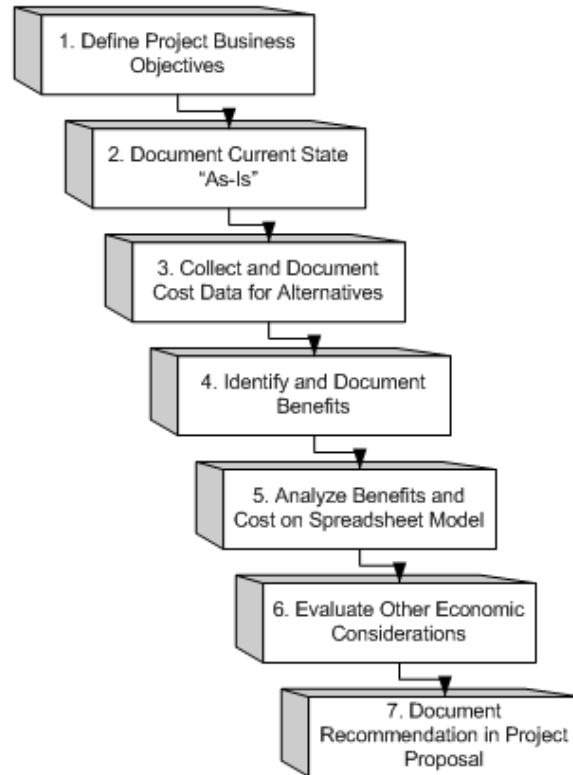


Figure B.2: Cost/Benefit Analysis Process Steps

B.2.1 Define project business objectives

The CBA should include the project business objectives and other pertinent background information. A CBA stands on its own and can be understood by a reviewer who is not intimately familiar with the agency and its business process. The project business objectives documented in the CBA must match the objectives listed in Project Business Case and Alternatives Analysis, and Charter. The objectives should improve the business process so agencies can better perform their mission. Key items addressed are:

- Business Problem/Issue Definition – A brief, compelling, service-oriented problem statement.
- Background – Pertinent issues such as staffing, system history, and customer satisfaction should be addressed.
- Project Business Objectives – A description of the specific objectives should be stated in terms of supporting the Agency's strategic plan.

It is crucial that the responsible manager understand the business issue when analyzing potential solutions.

B.2.2 Document current state – "as is"

The baseline for any CBA is the current process or "As Is" state. The CBA must thoroughly document the current operational environment, including the number of IT and operational staff, as well as their costs, to ensure that everyone involved in the CBA preparation and review understands that process. A clear understanding of current operations provides the

basis for decisions regarding new alternatives. Flow Charts and procedural outlines are good tools for documenting the current process.

B.2.3 Collect and document cost data

It is very important to accurately estimate the customer requirements because they drive the system design, and ultimately the system costs and benefits. The estimated future workloads, estimated useful life of an investment, and the period of time over which it is compared are all possible assumptions that need to be identified and considered. An assumption is something you believe to be true for purpose of this analysis.

The acquisition and implementation of an alternative influences existing agency operations. Realistically estimating the cost of this impact is part of the overall analysis. The collect cost data step is the preparation for the actual estimating costs and benefits in later steps.

B.2.3.1 Document CBA assumptions

Because a CBA often relies on many assumptions, it is important to document all of them, and, if possible, justify them on the basis of prior experiences or actual data. For example, you may assume that the PC hardware and software for a system will need to be upgraded every four years. This could be justified on the basis of the rapid increases in capacity and speed and decreases in cost for PCs over the past 15 years.

This can also be an opportunity to explain why some alternatives were not included in the analysis. Some alternatives are eliminated in the early stages of a CBA because of a conclusion that they are not feasible. If that conclusion is based on an assumption, the assumption must be clearly explained and justified.

B.2.3.2 Identify at least three alternatives

A CBA must present at least three alternatives. One alternative that should always be included in the CBA is to continue with no change. During the Business Process Evaluation, a number of alternatives may be considered. Other alternatives could be whether to develop, operate and/or maintain the system with in-house personnel or contractors. Other alternatives might explore a purely operational solution to the business problem; one that does not require technology. Each technical approach that is a viable alternative from a business process perspective should be included as an alternative. However, the number of technical approaches may be limited if only one or two are compatible with the Commonwealth Enterprise Architecture. Some alternatives can be addressed and rejected because they are not feasible for reasons other than costs and benefits.

Management has probably decided that the no change alternative is unacceptable, or you would not be looking at other alternatives; however, the costs and benefits of that alternative may not have been documented. Including that alternative should prove that it is not the best alternative. If there were other factors that make the no change alternative unacceptable, it would not be necessary to compare its costs and benefits against the feasible alternatives.

It is important to first define the costs of current operations, including the baseline technology, against which each alternative solution will be evaluated.

During the early stages of an IT project, there are many alternatives to be considered. This is particularly true during the Business Process Evaluation. If the business process is operating in a manner that makes best use of IT to maximize its efficiency and effectiveness, the process may not need to be changed. If the process can be changed to take advantage of IT, there may be two or more alternatives that appear to be feasible. If so, they may be alternatives that should be included in the CBA.

Any IT project that involves acquiring equipment should consider the alternatives of leasing and purchasing. With the rapid changes in technology, the useful life of desktop PCs has been reduced to less than 5 years.

B.2.3.3 Estimate and document project cost related to each alternative

Estimated costs are the potential resources consumed by the technology being considered. The cost categories include Internal Staff Labor, Services, Software Tools, Hardware, Supplies and Materials, Facilities, Telecommunications, Training, IV & V and Contingency (Risk). If the technology warrants, the cost categories can be further subdivided.

Category	Definition	Cost Items
Personnel		
Internal Staff Labor (Personnel Services)	Internal staff labor costs include the salaries and benefits of employees assigned at least part time to the project. (PM Guideline – Project Business Case and Alternatives Analysis)	<ul style="list-style-type: none"> • Project Manager • Administrative Support • IT Analyst • Application/Programming Analyst • Network Analyst/Engineering • IT Support
Services (Contractual Services)	Costs incurred as a result of the work performed by a contractor or vendor.	Contractor supplied development and maintenance
Facilities	System or project related floor space and utilities cost.	<ul style="list-style-type: none"> • Systems related floor space and utility cost • Project related floor space and utility cost
Hardware	Machinery and equipment (CPU, disks, tapes, modem, cables, etc.).	<ul style="list-style-type: none"> • Desktop workstations • Laptop computers • Peripheral servers • Communications hardware • Network Cabling • Auxiliary Furnishing
Maintenance and Support	Include expenditures for services provided to maintain computer software and/or hardware.	

Software Tools	All applications software, whether packaged or requiring development, and all systems software such as assemblers, compilers, CPU performance measurement systems, database management systems, file back-up and recovery, job accounting, operating systems, programming aids and development systems and soft-merge utilities. (APSPM)	<ul style="list-style-type: none"> • Purchased COTS applications • Desktop/workgroup software • Network operating systems • Applications development tools
Licenses	Include payments to software vendors for the renewal of software licenses for off-the-shelf applications and utilities.	Renewal of software licenses
Training	Includes expenditures such as registration fees and materials for attending training courses, workshops, and conferences on information technology.	<ul style="list-style-type: none"> • Computer based training (CBT) • Onsite training • Off site training • Training materials
IV & V	IV&V is a quality assurance process carried out by an <u>independent third party</u> . The best practice is to acquire the services of a qualified service provider. (COV ITRM Standard GOV2004 - 02.3.2 October 28, 2004)	
Contingency (Risk)	A contingency is defined as an unforeseen condition that affects costs of a capital project. (Volume No. 2—Classification & Coding Structure)	
Supplies and Material	Project related supplies and materials.	

B.2.3.4 Collect the Cost Data

Costs are the resources consumed by the technology being considered.

Cost data must be collected for estimating the cost and benefits of each project alternative. Look beyond the confines of your agency for help in developing cost data. Some external sources might include:

- Historical Organization Data: Historical contract data for an agency can be used to estimate the future purchase price of hardware, software, and services. If contracts were used to provide system support in the past, they can give you the costs for leasing and purchasing hardware and hourly rates for contractor personnel. Contracts for system support services for other systems in your agency can provide comparable cost data for the development and operation of a new system. Adjust the cost to reflect current year price levels. Document all adjustments for future reference.
- Market Research: Market research deals specifically with the gathering of information about a market's size and trends. Vendors are usually happy to provide cost information because it gives them an opportunity to market their services. Be sure to let them know you are only looking for generic cost data for planning and analysis purposes, and that no procurement is planned at the present time.

Organizations such as the Gartner Group and IDC Government can also provide assistance in developing cost data.

Contact several sources to provide cost estimates for computer hardware, software, networks, user support, outsourcing, etc. Prepare clear, detailed performance requirements to be the basis for the estimates. Quotes from multiple sources (if possible) will provide an average figure that should be realistic price. Check the technical content and scope of the quotes: low estimates may be omitting some necessary (and costly) services. Also, remember that a vendor quote is not usually prepared with the same level of effort as a bid on a contract.

The Request for Proposal (RFP) and Request for Information (RFI) are several formal solicitation methods available to collect information from potential providers or suppliers. The RFP is an invitation for providers of a product or service to bid on the right to supply that product or service to the individual or entity that issued the RFP. The RFI is a standard business process to collect written information about the capabilities of various suppliers. Both solicitation methods have required procedures established by Supply Chain Management and the Project Management Division, Virginia Information Technologies Agency.

- Industry Publications and Trade Journals: Industry publications and trade journals provide not only information on new products, but often include general prices and frequently publish reviews or comparisons of similar products.
- Web sites: Web sites frequently include pricing and are a good source of information. The Department of Planning and Budget is a potential source for cost data (Cost Category Model – Table 3.1) and the Virginia Department of Human Resource Management identifies labor categories and rates.

B.2.4 Identify and Document Benefits

Benefits are the services, capabilities, and qualities of each alternative system and can be viewed as the return on investment (ROI).

B.2.4.1 Identify Benefits

Every proposed IT project for an agency should have identifiable benefits for both the agency and its customers. Identifying these benefits will usually require an understanding of the business processes of the agency and its customers.

Some benefits realized by the agency are flexibility, organizational strategy, risk management and control, organizational changes, and staffing impacts. For example, new IT projects may allow some personnel to perform two different jobs with little or no extra training; or the new system may allow organizational changes that reduce the number of managers, or the new system may allow some jobs to be eliminated. These benefits are often measured in terms of productivity gains, staffing reductions, and improved agency effectiveness.

Possible benefits to customers include improvements to the current IT services and the addition of new services. These benefits can be measured in terms of productivity gains and cost savings, but the customers must be the ones to identify and determine how to measure and evaluate the benefits. Customer surveys are often needed to identify these benefits. At a minimum, the customers should be interviewed to identify the potential impacts of new or modified systems.

Consider the potential impact of a new or modified system in terms of:

- Accuracy -The degree of conformity of a measured or calculated value to its actual or specified value.
- Availability -The degree to which a system, subsystem, or equipment is operable and in a committable state at the start of a mission
- Compatibility - Capability of two or more items or components of equipment or material to exist or function in the same system or environment without mutual interference.
- Efficiency -measure of speed and cost.
- Maintainability - the ease with which a software system or component can be modified to correct faults, improve performance, or other attributes, or adapt to a changed environment.
- Modularity - the extent to which a system is made up of pieces independent in their own right, which makes for the easy assembly of simple autonomous parts into complex structures, is a hallmark of new software; software that's built for networking.
- Reliability - The probability that a functional unit will perform its required function for a specified interval under stated conditions.
- Security - A condition that results from the establishment and maintenance of protective measures that ensure a state of inviolability from hostile acts or influences.

When gathering data in preparation for evaluation of investments, include all benefits regardless of whether or not they initially appear difficult to support or quantify.

B.2.4.2 Determine Tangible Benefits

Tangible benefits originate from increased revenue, cost reduction, and cost avoidance. They measure, in dollar savings, the impact of an alternative on people, equipment, time, space and facilities, and support materials.

B.2.4.3 Identify and Document Intangible Benefits

It is necessary to identify and document intangible benefits for each alternative. These benefits are subjective issues that can exert strong influences on the alternative selection process, but can seldom be measured in dollar terms. Some intangible benefits are:

- Better and/or timelier decision-making
- More accurate information
- Better reporting
- Political response
- Goodwill in the community
- Personnel morale

B.2.4.4 Quantify the Intangibles

Intangible benefits from IT investments are, by definition, hard to quantify. Even bona fide impacts that enjoy a high probability of actually occurring can be excluded from the financial results because assigning a dollar value to that benefit is not a straightforward process.

The CBA should document all intangible benefits, including those that cannot be measured in terms of dollar value. The CBA should clearly and concisely state the qualities of the

intangible benefit and logically construct the conditions under which the benefit will influence the alternative. The recommended format for documenting intangible benefits is:

- Intangible Benefit Name
- Description
- Assumptions
- Advantages
- Conclusions

B.2.5 Analyze Benefits and Cost

At this point in the CBA process, the data is captured and analyzed. Information from the analysis is transferred to the Project Business Case and Alternatives Analysis Document and Project Charter.

B.2.5.1 Comparison of Solutions

Selection of a recommended solution is based on the comparison of how well each solution meets the same established criteria. Compare only the criteria used in the analysis of the solutions. Various techniques can be used in making this comparison. Such techniques include pro versus con comparison, plus or minus comparison, and numerical grading or ranking in a matrix format. A decision table utilizing any of these techniques should be prepared as part of the project analysis worksheet.

Based on the analysis performed, rate how each solution measured up against each decision criterion. A recommended Rating Scale is: 1 = Very Poor, 2 = Poor, 3 = Fair, 4 = Good, 5 = Very Good. Compare the rating results to determine which solution to recommend.

Decision Criteria	Solutions						
	#1	#2	#3	Etc.			
Business Process Impact							
Technical Feasibility							
Maturity of Solution							
Resources Required							
Constraints Impact							
Cost Benefit Analysis							
Return on Investment							
Other							
TOTAL							

B.2.5.2 Sensitivity Analysis

Sensitivity Analysis is a technique for determining the outcome of a decision if a key prediction turns out to be wrong. It indicates how much an investment's return (or Net Present Value) will change in response to a given change in an independent input variable, with all other factors held constant. This technique can be used on one variable at a time, or on a group of variables (sometimes referred to as scenario analysis). As a general

practice, variables with either the greatest uncertainty or variables that represent major components of an IT investment are selected for analysis.

B.2.5.3 Risk Analysis

All investments involve some degree of risk. Decision makers should know the likelihood of achieving the forecasted results of a proposal in order to make prudent decisions. Furthermore, identification of the explicit risk factors will initiate effective countermeasures to mitigate risk where possible.

Even the most carefully deliberated cost and benefit assessment carries some level of risk and uncertainty. All IT investments and projects should have a formal risk management plan in place regardless of the perceived level of need for it.

B.2.5.4 Return on Investment

Return on Investment is a ratio of the net benefits to the total cost of an investment for the same specific period.

Return on Investment (ROI) is a financial accounting measurement for determining the value of making a specific investment. ROI is a ratio of the net benefits to the total cost of an investment for the same specific period. The two principle concerns with ROI are that the calculations do not account for the time value of money and the calculations assume a consistent annual rate of return. ROI is a useful measure when comparing alternatives using the same cost and benefit criteria for the same period.

The difficulty inherent in calculating the ROI for an investment arises from the problems associated with identification of all the benefits received and all the costs incurred from an investment. ROI may be calculated for any time period; but when making investment decisions, calculate ROI for the total life of the investment.

Agencies need to revisit their assumptions on a regular basis, update their data, and re-evaluate their ROI calculations. A solid and thorough ROI analysis comfortably nestles in the life cycle approach to IT investment and management. A well-performed analysis will build a comprehensive and reliable history of costs and decision-making outcomes that are updated throughout the life of the project.

Agencies should build an accessible record of this archived information to facilitate better and easier evaluation of future projects.

B.2.5.5 Payback

The payback method determines the time necessary for a new investment to pay for itself. Payback does not measure profitability, but cash recoverability. Payback tends to show the risk factor by pointing out the recovery time of an investment. Its primary advantage is its simplicity - it is quick to calculate and easy to understand. Its limitations include:

- Does not consider the benefit of net results after the investment has been repaid - it is a break-even measurement, not a profitability measurement; and
- Does not take into account the time value of money.
-

	Year					
Project A	0	1	2	3	4	5
Total Net Benefit		60	60	60	60	60
Initial Investment	200					
Project B	0	1	2	3	4	5
Total Net Benefit		80	75	70	65	0
Initial Investment	200					

In the above example, the payback of project A is 3.3 years. This is determined by adding the expected annual cash flows until the original investment has been recovered. Thus, by the end of year 3, \$180,000 of the original investment has been recovered; and, about one third of the way into year 4, the final \$20,000 of the initial investment would have been recovered. Following this procedure for investment B, the customer discovers that the payback for this equipment is 2.6 years.

B.2.5.6 Net Present Value (NPV)

The net present value (NPV) of an investment is the present (discounted) value of future cash inflows minus the present value of the investment and any associated future cash outflows. By considering the time value of money, it allows consideration of such things as cost of capital, interest rates, and investment opportunity costs.

NPV is important because without using the net present value of benefits and cost the comparisons drawn between solutions in the out years are not accurate. This metric recognizes that money has different real value over time and makes the values of money constant by discounting costs and benefits over a specific period of time—an asset's life cycle or any selected period of analysis. NPV allows managers to compare, on purely financial factors, investment alternatives with widely disparate cash flows. NPV facilitates objective evaluation of projects regardless of scale differences or the existence of capital rationing, and can be used to compare independent or mutually exclusive projects.

For each year of the analysis period, cash inflows (benefits) and cash outflows (costs) are totaled and then summed to arrive at the net impact on cash. The net cash flow is then multiplied by an appropriate discount factor to arrive at a discounted cash flow for each year. NPV is the total of these discounted cash flows over the period of analysis.

Generating a meaningful NPV requires sound estimates of the costs and benefits of a project, use of the appropriate discount rate, and the identification of the timing of cash receipts and disbursements. NPV focuses on an investment's impact on cash flow rather than net profit, or savings in the case of non-revenue generating entities. Thus, only an investment's effects on cash are considered.

In the example below, we see that project B is the more favorable investment with a NPV of \$5,448. The projected cash flow each investment generates are discounted at a 16% rate and then totaled with the initial investment cash outflow of \$200,000. The result is the Net Present Value.

Year	Present Value of \$1	Cash Flow	Discounted Cash Flow	Cash Flow	Discounted Cash Flow
0	1.0	(200,000)	(200,000)	(200,000)	(200,000)
1	.862	60,000	51,724	80,000	68,966
2	.743	60,000	44,590	75,000	55,737
3	.641	60,000	38,439	70,000	44,846
4	.552	60,000	33,137	65,000	35,899
5	.476	60,000	28,567	0	0
	NPV		(3,543)		5,448

B.2.6 Evaluate Other Economic Considerations

Some benefits and costs associated with a project may not be captured by dollar figures alone. The Project Manager should give some consideration to factors which may not be quantifiable in step 5. These include, but are not limited to:

- Social return on investment
- Constituent goodwill and associated future considerations
- Public opinion

B.2.7 Document Recommendation in Project Proposal

Prepare the recommendation in a format prescribed by the COV Project Business Case and Alternatives Analysis (BCAA). The BCAA requires an economic justification for the project based upon the Cost Benefit Analysis and the expected return on investment. Identify the estimated funding resources required to complete the project and then identify the funding requirements to operate or maintain the product(s) or service(s) developed from the project.

Anticipate areas of discussion, including intangible benefits, and prepare charts and graphs to display critical elements such as payback comparisons. Intangible benefits should be presented and discussed to ensure that their implications are understood.

The recommendation conveys an understanding of the problem faced by the agency, the alternatives considered, the alternative chosen to solve the problem, and the costs involved in implementing the recommended solution.

B.3: List of CBA Benefit Characteristics

The following classification is provided for the purpose of illustrating identification of characteristics of benefits:

Expanded services or products delivered to public and internal or external customers:

- Improves ability to deliver – Providing staff with access to information via desktop PC's allows them to respond to customer inquiries more accurately and quickly.
- Improves access to services – The investment increases the number of people reached. Customers can communicate with an agency by telephone, e-mail, or Internet in addition to existing mail services.

- Improves access to information – Internal users gain direct access to resources or information enabling them to perform daily tasks more efficiently. The Public can obtain information on tax issues, health services, etc. via the Internet or telephone.
- Improves accuracy – The investment improves accuracy by reducing the need for manual data entry or reducing number of data entry errors, thus improving integrity of data. This may also improve productivity and reduce operating costs by reducing time spent on error correction.
- Improves compatibility – One alternative is more compatible with existing facilities and procedures, requiring less training of personnel or less new equipment and software. System meets agency's IT architecture requirements.
- Improves effectiveness and impact of information delivered – On-line interactive training tutorials provide employees unlimited opportunities to improve skills, increase participation in training, and improve retention of new information. This may increase productivity, reduce turnover, etc.
- Improves security – System improves security in terms of fraud prevention, protection of confidential information, or enhances data integrity.
- Reduces risk – Back-up systems that reduce the risk of data loss or applications that improve timely delivery of critical information.

Cost Savings/Cost Avoidance:

- Improves the ability to maintain a system – Investments for which maintenance resources (personnel, experience, components) are more readily available. Ease of maintenance is relevant to both software and hardware.
- Eliminates duplicate assets – Investments that replace multiple, non-compatible, stand-alone systems.
- Improves reliability – System has better performance record (less down-time) than legacy process or system. Reductions in downtime inversely impact productivity and may also reduce labor costs.
- Accommodates increases in workload or demand without additional costs - Systems that will 'avoid' hiring additional personnel to handle increased workload or new agency responsibilities in the future.
- Reduces manual operations – Systems that automate manual processes thereby freeing staff resources to perform other functions, reducing or eliminating FTE requirements. Systems that allow functions to be performed by lower level staff.
- Improves efficiency – Assets that improve access to information or tools that decrease time required to perform daily functions. A system may provide faster or more accurate aggregation and analyses of data.

Enhanced Work Environment:

- Facilitates ease of use – Although user-friendly systems are generally thought of in terms of increased efficiency or productivity, they can also improve the social and physical environment for employees.
- Improves physical environment – Systems that reduce the amount of paper clutter in the work area, noise, or eyestrain.
- Improves response rates – Assets that reduce stress by improving employees' ability to respond to customer inquiries.

B.4: Questionnaire for Initial CBA Data Collection

Audience: Project Sponsor, Project Manager-designee (if identified) and Stakeholders should review the following questions.

1. What are the agency's/function's/group's major goals and strategies?
2. How will your agency change over the next five years?
3. Who are your customers/constituents? What do you provide to your Customers/constituents?
4. What is your "service"? How do your activities fit in with delivering that service?
5. What is success to you and to your stakeholders? How is that success measured?
6. What are the step-by-step activities that occur in your group to get your "service" to your "customer"?
7. How does your group interact with other groups? Who are you dependent on and who is dependent on you for success?
8. How many people are involved in your group? How many projects, activities? What is the average project time?
9. What are your average costs of labor and other factors?
10. Where do you see the most problems in accomplishing your job (in your group, department, and agency)?
11. What are the major problem areas you plan to address this year? How do you rank them in importance?
12. How does this problem hurt your group, department, agency, etc.? Are you losing time, money, quality, etc.? How much? What is the impact to your group and your agency?

B.5: Questionnaire for CBA Benefits Verification

Audience: Project Sponsor, Project Manager-designee if appointed and Stakeholders should review the following questions

1. What benefits do you expect to see from these proposed changes? Can you see [specific benefit] occurring?
2. How much improvement do you expect in time, quality, cost reduction for labor, materials, etc., cost avoidance for labor, etc., revenue?
3. Will all the benefits occur in your area [direct benefits] or will some occur in other areas [indirect benefits]?
4. Do you agree that this proposal can help you address your problems?
5. Do the benefits look right to you and do you believe that this solution will generate benefits in the estimate ranges?
6. Here are some additional benefits that we have uncovered. Do you think you could see any of these occurring with this investment?
7. Are there any potential benefits missing from the list?
8. Are there any additional expenditures that you may need to make if you implement this solution that I am proposing?
9. How would you use any time benefits achieved by this investment? To lower labor costs, increase revenues or a mixture of the two?
10. I have made a summary sheet of the expected amount of benefits that we agreed could result from this investment, could you please help me estimate the dollar value for each of these?
11. What percentage of each of the benefits we discussed earlier do you feel could be attributed to the proposal?
12. Do these benefit estimates look okay? If not, how would you change them?
13. What is high, low, most likely levels of benefits you would expect to see from implementing this proposal?
14. Do you feel that you have all the information you need and that your managers need to understand the value of this proposal to your business?

15. Do you understand the strategic impact of this investment; how it will change the way you do business, and how to manage it to achieve your desired goals and benefits?
16. How can we prove the value of this investment to your senior managers?

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